

# The Burden of Asthma in Indiana: Second Edition

March 2008

Asthma Program   
Indiana State Department of Health



Mitchell E. Daniels, Jr.  
Governor

Judith A. Monroe, M.D.  
State Health Commissioner



# Indiana State Department of Health

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March 2008

Dear Reader:

Asthma is a common chronic disease affecting more than half a million Hoosiers. The Indiana State Department of Health's Asthma Program and the Indiana Joint Asthma Coalition compiled *The Burden of Asthma in Indiana: Second Edition (January 2008)* to help identify persons with asthma and provide vital information on the quality of life for those with asthma and how people with asthma manage their disease.

Asthma disproportionately affects certain populations in Indiana - women, children, certain minorities and the poor – with higher prevalence rates, hospitalizations, emergency department visits, and death. The reasons for these disparities are unclear, but still warrant our attention to help reduce asthma morbidity and mortality in our state. There is not a cure for asthma, but it can be controlled. Asthma's negative impact on health, quality of life, and the economy in Indiana continues to grow. The disease often results in restricted activities, school and work absenteeism, multiple hospitalizations and visits to emergency room departments, and disruption of family and caregiver routine.

The Asthma Program works closely with the Indiana Joint Asthma Coalition to develop and implement interventions that improve the health and quality of life of Hoosiers with asthma. The program also maintains a comprehensive surveillance system for the ongoing, systematic collection of asthma data. In addition to data collection, the system also allows for analysis and interpretation of asthma data, which is essential to the planning, implementation, and evaluation of the program. The following report is a result of the Asthma Program's data and surveillance activities.

The Asthma Program uses this report to help increase people's awareness of asthma as a major public health issue in Indiana and to implement asthma interventions and develop public policy. I encourage our partners to do the same.

For a Healthier Tomorrow,

JUDITH A. MONROE, M.D.  
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The Indiana State Department of Health supports Indiana's economic prosperity and quality of life by promoting, protecting and providing for the health of Hoosiers in their communities.

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March 2008

Prepared by the Indiana State Department of Health Asthma Program and the  
Indiana Joint Asthma Coalition

State Health Commissioner  
Judith A. Monroe, M.D.

The following individuals greatly contributed to the creation of the Second Edition of this report. Their time and effort is critical to continuing the Indiana State Department of Health Asthma Program and the Indiana Joint Asthma Coalition mission of reducing the burden of asthma in Indiana.

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## EXECUTIVE SUMMARY

The purpose of this report is to describe the burden of asthma among Hoosiers. It is an update to *The Burden of Asthma in Indiana, 2004*. The target audience for this report includes all persons, agencies, and organizations that take an active role in planning, implementing, and evaluating asthma activities throughout Indiana. This includes the Indiana State Department of Health (ISDH) Asthma Program, the Indiana Joint Asthma Coalition (InJAC) and its membership, local health departments, health care professionals, community based organizations, legislators and other policymakers.

The ISDH Asthma Program has developed a comprehensive asthma surveillance system that collects, analyzes, and interprets data. The surveillance system includes four primary sources of data. These sources of data provide information on specific measures, including adult and child asthma prevalence, asthma deaths, inpatient and outpatient asthma hospitalizations, asthma management, and quality of life. Following are the four data sources:

1. The **Behavioral Risk Factor Surveillance System (BRFSS)**, a telephone survey developed by the Centers for Disease Control and Prevention (CDC), monitors state-level prevalence of the major behavioral risks among adults associated with premature morbidity and mortality and includes core questions and two asthma modules assessing asthma in adults and children.
2. **Hospital discharge data** from the Indiana Hospital Association. The data include information on inpatient and outpatient hospitalizations throughout Indiana with a discharge diagnosis of asthma.
3. **Mortality statistics** from death certificates reported to the ISDH.
4. **Medicaid administrative data** from the Indiana Office of Medicaid Policy and Planning (OMPP). These include claims for health care expenditures of children, pregnant women, and low-income individuals and families (generally with income less than 200% of the federal poverty level). Indiana Medicaid also includes populations in the Medicaid Select program (a health insurance program for Medicaid-eligible residents who are blind, aged and disabled) and in Traditional Medicaid (fee-for-service). Claims are submitted to Indiana Medicaid for provider reimbursement, and include hospitalizations, emergency room and doctor visits, and medications for those services and medications which Indiana Medicaid covers.

There are limitations in the available data (Appendix A); for this reason, the view of asthma is somewhat imprecise. Data reporting and collection is often imperfect. Some data applies only to certain populations, and different sources of data require different case definitions for asthma. Additionally, there can be gaps in the data, such as a lack of county level prevalence data and a lack of comprehensive cost data specific to Indiana. Gaps in the data can result from a lack of funding, accessibility, and methods to collect the data.

Regardless of data gaps and limitations, the view of asthma is more robust in this report than what was reported in *The Burden of Asthma in Indiana, 2004*. Data from the BRFSS Adult Asthma History module (Appendix B) and Childhood Asthma Prevalence module have been reported for the first time. These data provide more detailed information from adults on their asthma and disease management as well as childhood asthma prevalence. Also for the first time, emergency department (ED) rates are being reported. Lastly, the state's hospitalization data, including ED visits, and mortality data are being compared to the Healthy People 2010 objectives on asthma. All the data in this report provide information on the asthma burden in Indiana, which can guide new initiatives in asthma control and track improvements as these initiatives move forward.

## Key Findings

According to the key findings, asthma disproportionately affects certain populations in Indiana – women, young children, certain minorities and the poor – with higher prevalence rates, hospitalizations, ED visits, and death.

### *Adult Asthma Prevalence (2005)*

- Approximately 590,000 (12.7%) adults in Indiana had been diagnosed with asthma in their lifetime.
- Approximately 380,000 (8.2%) adults in Indiana currently have asthma.
- Both lifetime and current asthma prevalence in Indiana had been relatively stable since 2000.
- Current asthma prevalence was significantly higher among adult females, adults with less than a high school education, and adults with an annual household income less than \$15,000.
- In the past 12 months among adults with current asthma, 50% experienced an asthma episode or attack and 40% had not had a routine checkup for asthma.
- During the past 30 days among adults with current asthma, 32.9% reported having symptoms one or more times a week (but not every day), 23% reported having symptoms every day (one third of these adults had symptoms all the time), and 32.3% reported three or more days of difficulty staying asleep due to asthma symptoms.
- 16.4% of adults with current asthma used a prescription inhaler 15 or more times during the past 30 days during an asthma attack.
- 60.2% of adults with current asthma did not receive an influenza (flu) shot in the past year.
- One third of adults with current asthma were current smokers.
- Adults with current asthma were twice as likely to report not seeing a doctor because of cost compared to those who never had asthma and reported a “fair” or “poor” health status more often compared to adults who never had asthma.

### *Child Asthma Prevalence (2005)*

- Approximately 140,000 (8.4%) children in Indiana currently have asthma.
- There is no difference in current asthma prevalence between children (8.4%) and adults (8.2%).

### *Hospitalizations (2005)*

- Indiana’s asthma hospitalization rate had been relatively steady from 2002 to 2005 (12.8 per 10,000 to 13.2 per 10,000).
- Indiana’s asthma hospitalization rate was lower than the national rate.
- The number and rate of asthma hospitalizations were higher for females than males. This was true regardless of race.
- The asthma hospitalization rate for blacks was more than two and a half times higher than the rate for whites.
- Adults aged 75-84 had the highest asthma hospitalization rate (28.1 per 10,000) compared to all other age groups.
- Males  $\leq$  14 years old had higher asthma hospitalization rates than did females of the same age.
- Females  $\geq$  19 years old had higher asthma hospitalization rates than did males of the same age.

**Key Findings – Continued***Emergency Department (ED) Visits (2005)*

- The number and rate of asthma ED visits were higher for females than males.
- The asthma ED rate for blacks was more than three times higher than the rate for whites.
- Young children aged 0-4 had the highest asthma ED rate.
- Males  $\leq 14$  years old had higher asthma ED rates than did females of the same age.
- Females  $\geq 19$  years old had higher asthma ED rates than did males of the same age.

*Mortality (2005)*

- The total number of deaths due to asthma declined from 104 in 1999 to 85 in 2005.
- The asthma mortality rates for females and blacks were higher than the rates for males and whites. This has been the trend for several years.
- The age-specific asthma mortality rate increased with age.

*Medicaid (2006)*

- Medicaid data are substantially underreported and may be unevenly reported. Medicaid data in this report should be interpreted with caution.
- Of the 635,348 adults and children under age 65 enrolled in Medicaid 48,252 (7.6%) had a diagnosis of asthma.
- Asthma prevalence was higher for whites than for other races (i.e. blacks, Hispanics, and other races). This finding was present regardless of age.
- Asthma prevalence for males  $\leq 17$  years old enrolled in Medicaid was higher than for females of the same age. However, adult females enrolled in Medicaid had higher asthma prevalence than did adult males.

*Healthy People 2010*

- Indiana has met Healthy People 2010 Objectives for asthma hospitalizations among children under 18, the asthma mortality rate for individuals 65 years and older, and asthma ED rates for age groups 5-64 and  $\geq 65$ .

## INTRODUCTION

Asthma is a chronic disease that affects the airways and lungs. When a person has asthma, the inside walls of the airways of the lungs are inflamed, making them more sensitive and more reactive than the airways of a person who does not have asthma. The airways react more strongly to triggers, including: dust mites, cockroaches, animal dander, mold, pollen, tobacco smoke, and exercise. Not every person with asthma has the same triggers. Common symptoms of asthma include coughing, wheezing, shortness of breath, and chest tightness. Both children and adults can have asthma. The severity of the disease may differ from one person to the next. Though asthma cannot be cured, it can be controlled.

Asthma affects millions of Americans. According to the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics, in 2005 an estimated (1)

- 32.6 million people had been diagnosed with asthma during their lifetime;
- 22.2 million people currently had asthma (this includes 6.5 million children who currently had asthma); and
- 12.2 million people experienced an asthma attack in the previous year.

In 2004, asthma accounted for

- 13.6 million doctor visits;
- 1 million hospital outpatient visits;
- 1.8 million ED visits; and
- 3,816 deaths.

Adults and children living in Indiana can be counted in the above numbers. Asthma's negative impact on health, quality of life, and the economy in Indiana continues to grow. It often results in restricted activities, school and work absenteeism, hospitalizations and visits to emergency room departments, and disruption of family and caregiver routine.

The Indiana State Department of Health's (ISDH) Asthma Program has been a funded grantee of the CDC's National Asthma Control Program since 2001. The mission of the Asthma Program is to reduce the burden of asthma in Indiana.

The Asthma Program works closely with the Indiana Joint Asthma Coalition (InJAC) to develop and implement interventions that improve the health and quality of life of people in Indiana with asthma. Interventions are planned based on the goals and objectives of *A Strategic Plan for Addressing Asthma in Indiana (2004)*. To assist in planning interventions and to help program partners, the Asthma Program also maintains a comprehensive surveillance system for the ongoing, systematic collection of asthma data. In addition to data collection, the system also allows for analysis and interpretation of asthma data, which is essential to the planning, implementation, and evaluation of the program. The following report is a product of the Asthma Program's surveillance system. The report is a comprehensive review of asthma data collected in 2005 and 2006.

## BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM (BRFSS)

The BRFSS is a random-digit dialed telephone survey of the non-institutionalized civilian population of the United States aged 18 and older. It was initiated by the Centers for Disease Control and Prevention (CDC) in 1984 to monitor state-level prevalence of major behavioral risks among adults associated with premature morbidity and mortality. The BRFSS has been conducted annually in all 50 states since 1994 (2).

The BRFSS consists of three parts: a core question set asked by all states, optional health behavior/risk factor modules, and state-added questions. The core question set includes two general measures for the prevalence of asthma, lifetime and current:

- **Lifetime asthma prevalence** is determined by responses of “yes” to the question: “Have you ever been told by a doctor, nurse, or other health professional that you have asthma?”
- **Current asthma prevalence** is determined by responses of “yes” to both questions: “Have you ever been told by a doctor, nurse, or other health professional that you have asthma?” and “Do you still have asthma?”

The two categories are not mutually exclusive. Persons classified as currently having asthma are a subset of persons diagnosed with asthma during their lifetime. Asthma interventions are typically targeted to individuals currently having asthma as those with current uncontrolled asthma are suffering from asthma symptoms, experiencing activity limitations, and incurring the financial costs of asthma.

There are two optional modules for asthma: the Adult Asthma History module and Childhood Asthma Prevalence module. Also, the Asthma Call-Back survey is available. Indiana implemented this survey in 2006, and it will be covered in a separate report.

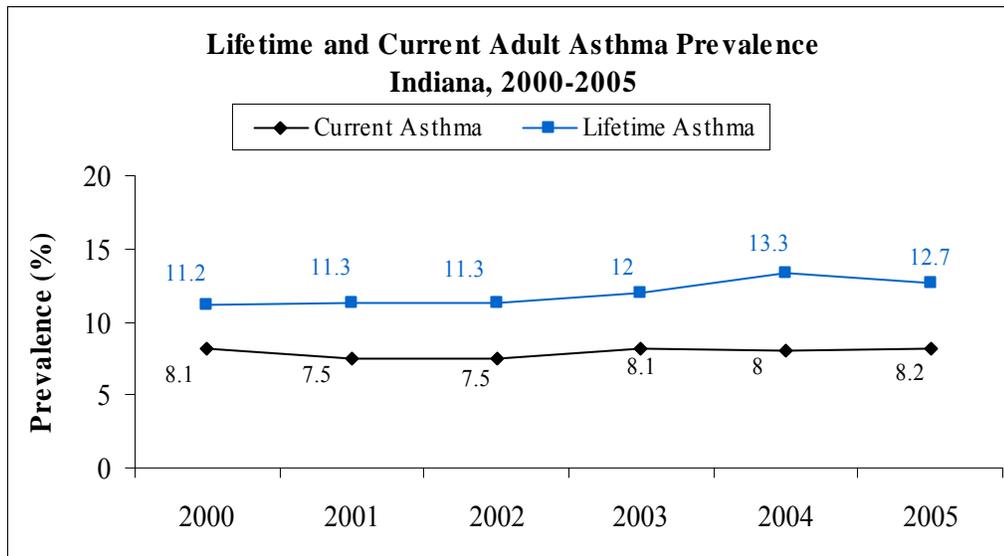
The Adult Asthma History module (Appendix B) collects more detailed information from adults with asthma including the severity of their disease (medication use, emergency room visits, etc). The Childhood Asthma Prevalence module asks the adult respondents if there are any children in the household that have been diagnosed with asthma and if so, does the child still have asthma.

The BRFSS provides a means to estimate the prevalence of asthma in Indiana. Since the core question set is used for all states, it also allows comparison to the other 49 states, the District of Columbia and the nation as a whole. The data presented in this report are from the 2005 BRFSS, in which Indiana used both the Adult Asthma History module and Childhood Asthma Prevalence module. Asthma data has also been cross-tabulated with other BRFSS measures to compare risk factors and quality of life of persons with asthma to those without asthma.

### Adult Asthma Prevalence

In 2005 among adults in Indiana, the lifetime prevalence of asthma was 12.7% (about 590,000 people) and the current prevalence of asthma was 8.2% (about 380,000 people). Of the 590,000 adults reporting ever being diagnosed with asthma in their lifetime, 64% currently have asthma. Both lifetime and current asthma prevalence have been relatively stable since 2000 (Figure 1). The national prevalence of lifetime and current asthma in 2005 were 12.6% and 8.0%, respectively. The national current asthma prevalence has also been relatively stable since 2000, ranging from 7.3% to 8.0% (2).

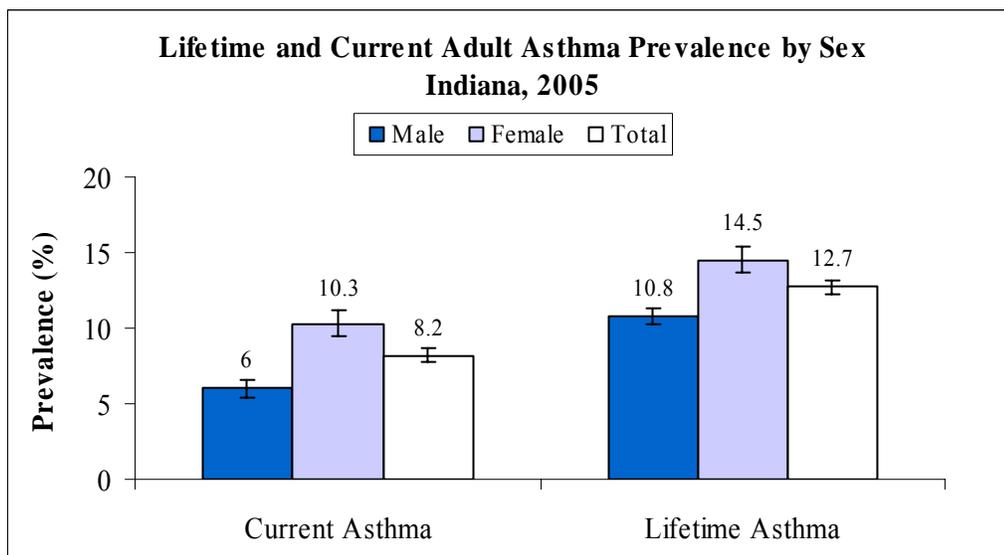
**Figure 1**



Source: Indiana BRFSS

Current and lifetime asthma prevalence were higher for females (10.3% and 14.5%, respectively) than for males (6% and 10.8%, respectively) (Figure 2). The difference in prevalence was statistically significant.

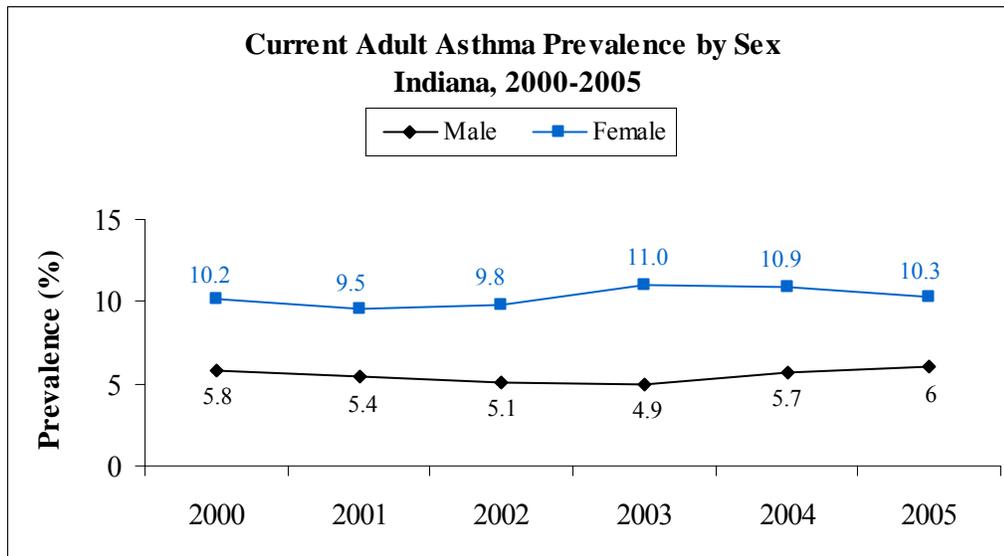
**Figure 2**



Source: Indiana BRFSS - error bars represent 95% confidence intervals

Since 2000, the prevalence of current asthma among men and women has been relatively stable (Figure 3). Historically, the prevalence of current asthma among women is higher than men.

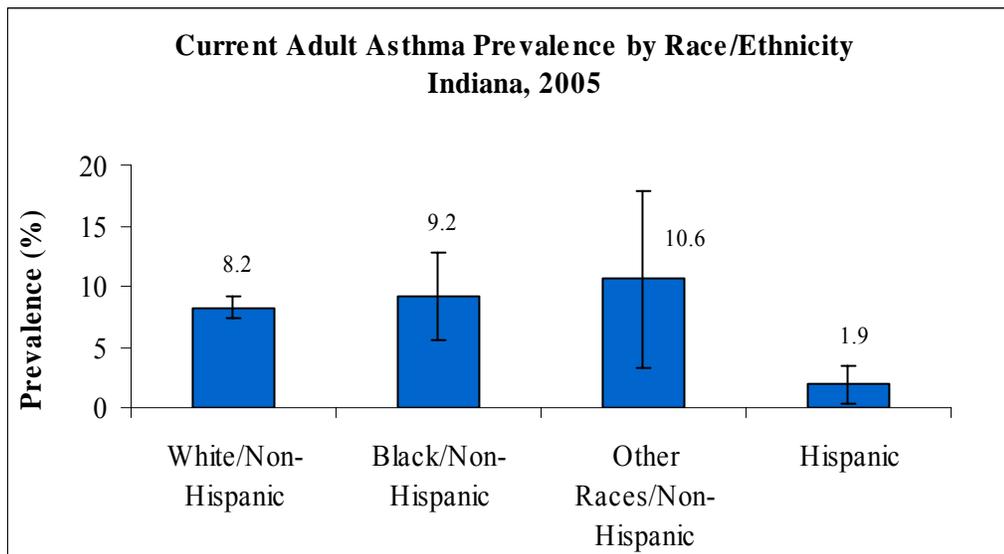
**Figure 3**



Source: Indiana BRFSS

In Indiana, differences in adult current asthma prevalence can be seen among races and ethnicities; however, most were not statistically significant. In 2005, the current asthma prevalence of Hispanic adults was significantly lower compared to black and white adults (Figure 4).

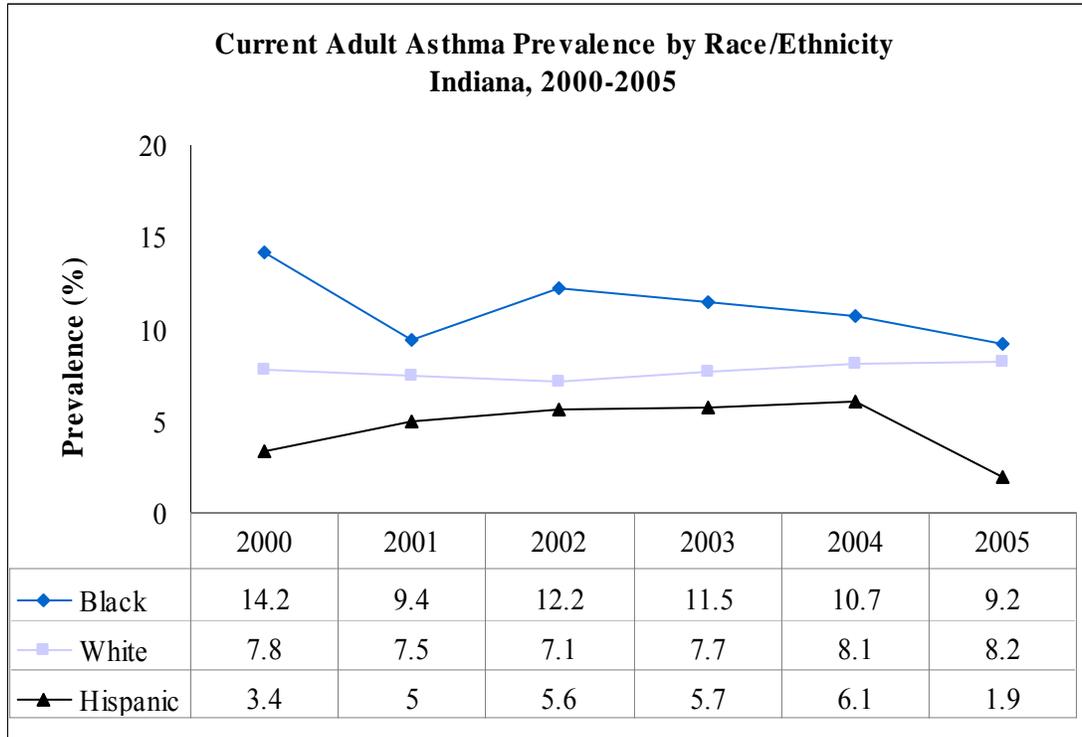
**Figure 4**



Source: Indiana BRFSS - error bars represent 95% confidence intervals

No other significant differences between races/ethnicities were found in Indiana between 2000 and 2005. Also, no significant differences were found within specific races/ethnicities across time (Figure 5). For example, from 2000 to 2005, the current asthma prevalence among black adults ranged from 14.2% to 9.2%, but this difference was not statistically significant.

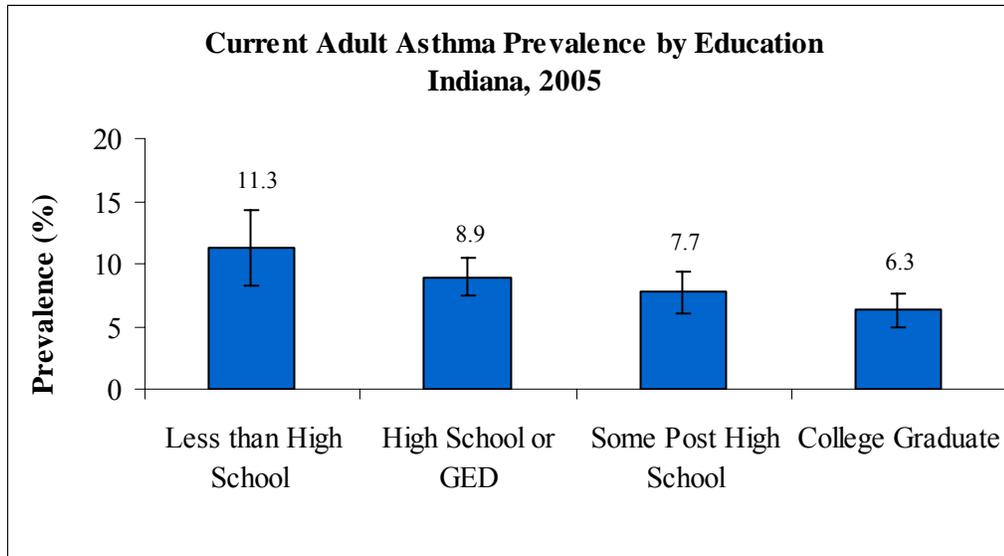
**Figure 5**



Source: Indiana BRFSS

There was a significant difference in current asthma prevalence between college graduates (6.3%) and persons with less than a high school education (11.3%). There were no other significant differences among the other educational groups (Figure 6).

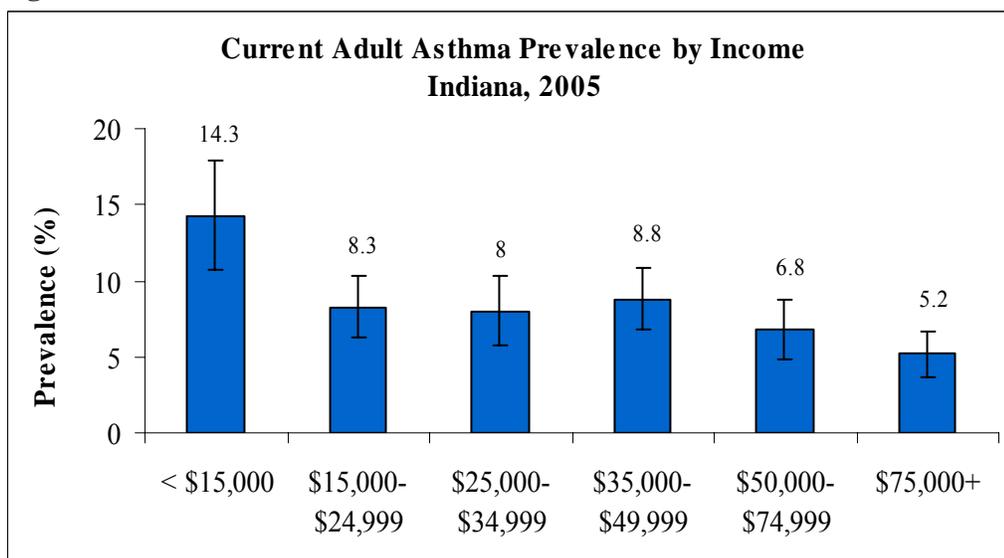
**Figure 6**



Source: Indiana BRFSS - error bars represent 95% confidence intervals

Adults with an annual household income less than \$15,000 per year were significantly more likely to report currently having asthma (14.3%) than higher income groups except for those households with incomes of \$35,000-\$49,999 (Figure 7). The current asthma prevalence among those with a household income less than \$15,000 was almost triple the prevalence of those with a household income greater than \$75,000 and more than double the prevalence of those with a household income between \$50,000 and \$74,999.

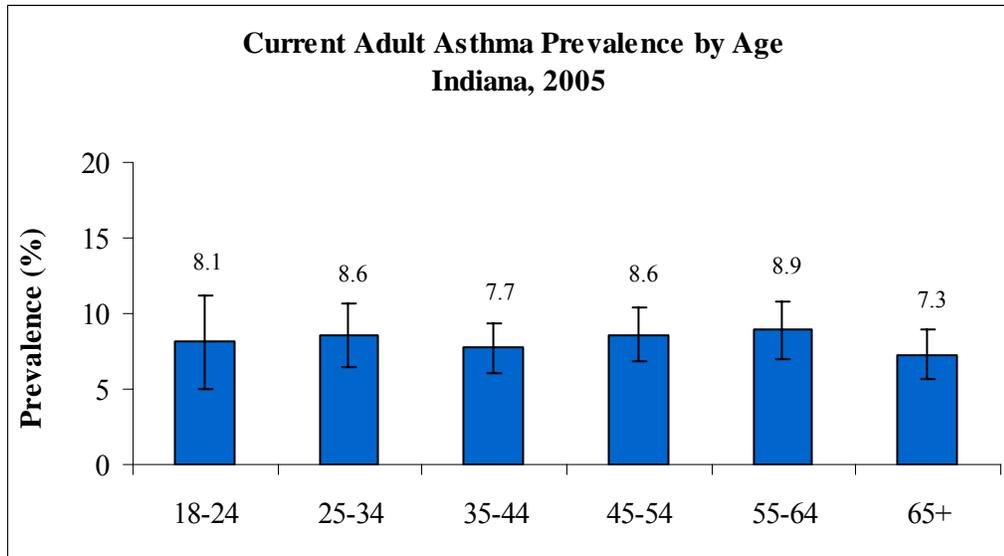
**Figure 7**



Source: Indiana BRFSS - error bars represent 95% confidence intervals

Current adult asthma prevalence changes vary little by age. Adults 55-64 had the highest reported current asthma prevalence (8.9%), but the difference was not statistically significant when compared to other age groups (Figure 8).

**Figure 8**



Source: Indiana BRFSS - error bars represent 95% confidence intervals

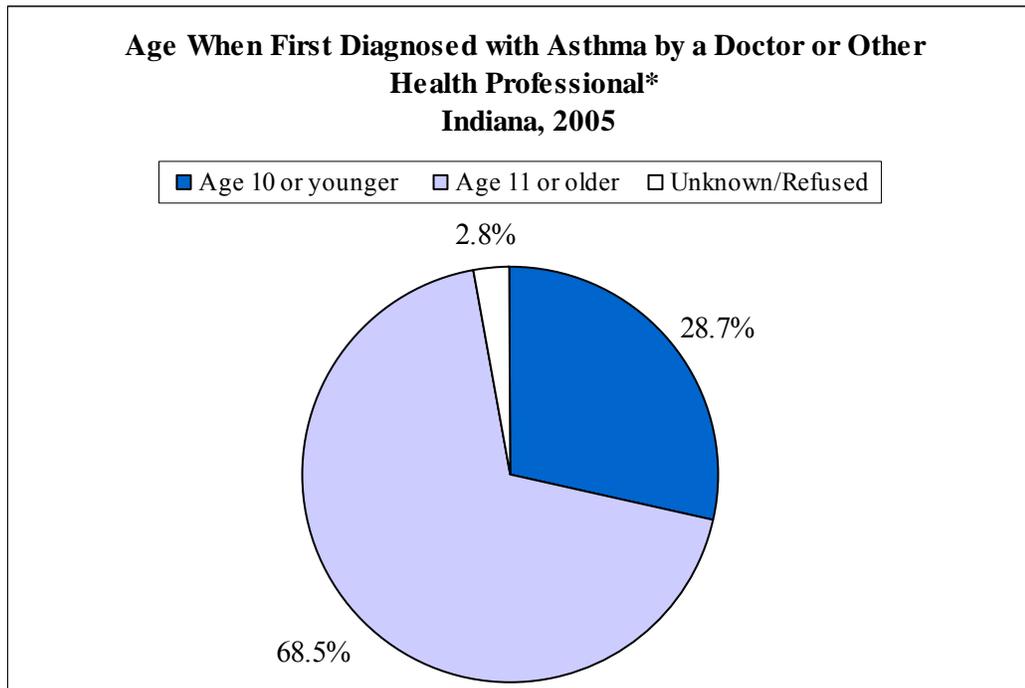
### **Adult Asthma History Module**

For this report, 8 of 10 questions from this module were used to measure the level of asthma control in respondents with current asthma. Information from a question regarding age of diagnosis is also included, which is not specific to measuring level of asthma control. The questions from the module were each cross-tabulated with sex, age, education level and income. The sample size was not large enough to cross-tabulate by race/ethnicity. Unless a significant difference or trend was observed between groups, the cross-tabulated graphs were omitted from this report.

#### ***Age of Diagnosis***

Of those adults in Indiana that have ever been diagnosed with asthma, 28.7% were diagnosed at age 10 or younger and 68.5% were diagnosed at age 11 or older (Figure 9).

**Figure 9**

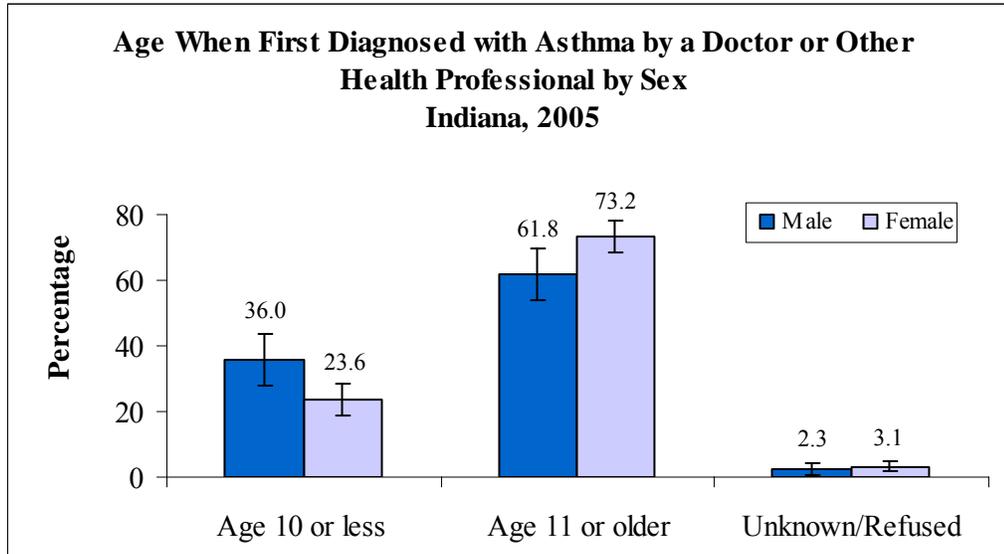


Source: Indiana BRFSS

\* Respondents are those adults with lifetime asthma.

As shown in Figure 10, more males (36%) were diagnosed with asthma at age 10 or younger than females (23.8%). However, the difference was not statistically significant. The largest percentage of males and females reported being diagnosed with asthma at age 11 or older (61.8% and 73.8%, respectively). However, the difference between the sexes was not statistically significant.

**Figure 10**

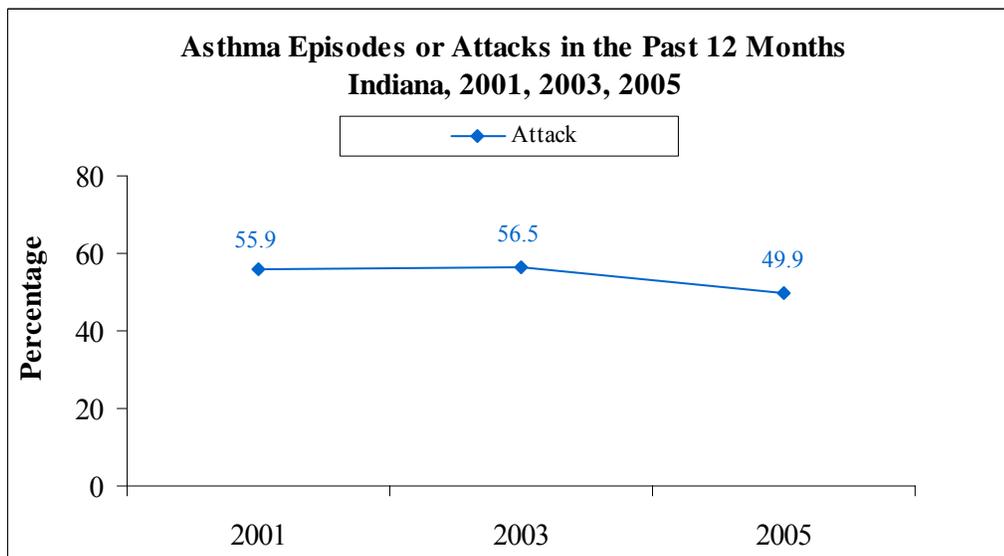


Source: Indiana BRFSS - error bars represent 95% confidence intervals

### ***Asthma Attack in the Past 12 Months***

In 2005, approximately half of the adults with current asthma experienced an attack in the past 12 months (Figure 11). This was a decline from the percentage of adults that experienced an attack in 2001 and 2003, though the difference was not statistically significant.

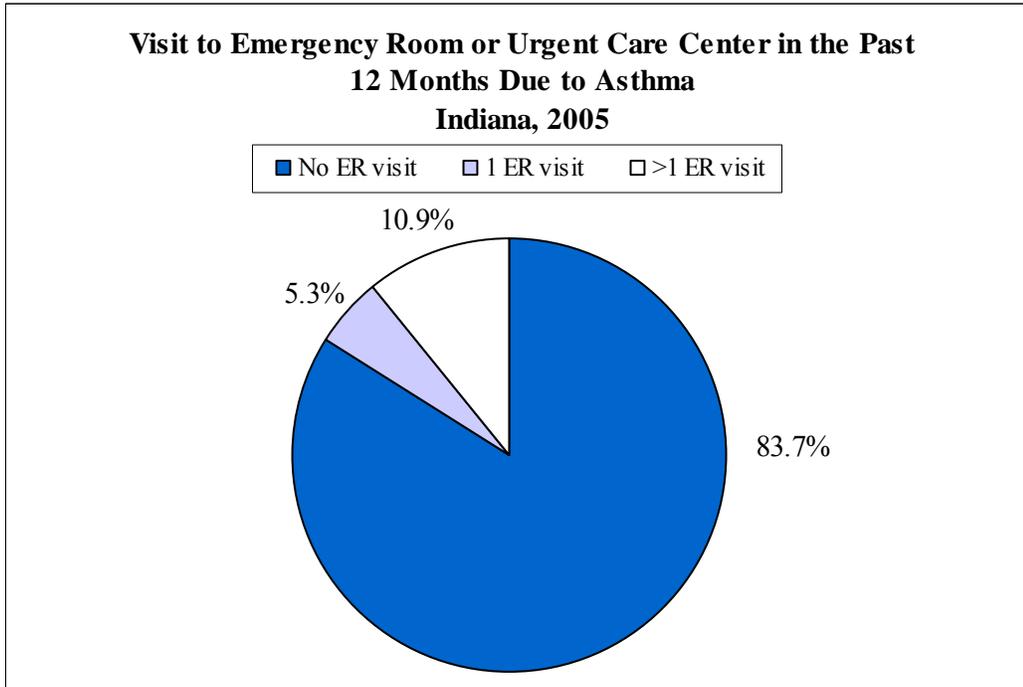
**Figure 11**



Source: Indiana BRFSS

***Visit to an Emergency Room or Urgent Care Center in the Past 12 Months Due to Asthma***

Approximately 84% of adults with current asthma reported no visits to the emergency room or an urgent care center due to their asthma, 5.3% visited once, and 10.9% visited more than once. Out of the 16.2% of adults with current asthma who visited an emergency room or an urgent care center for their asthma, two thirds had two or more visits (Figure 12).

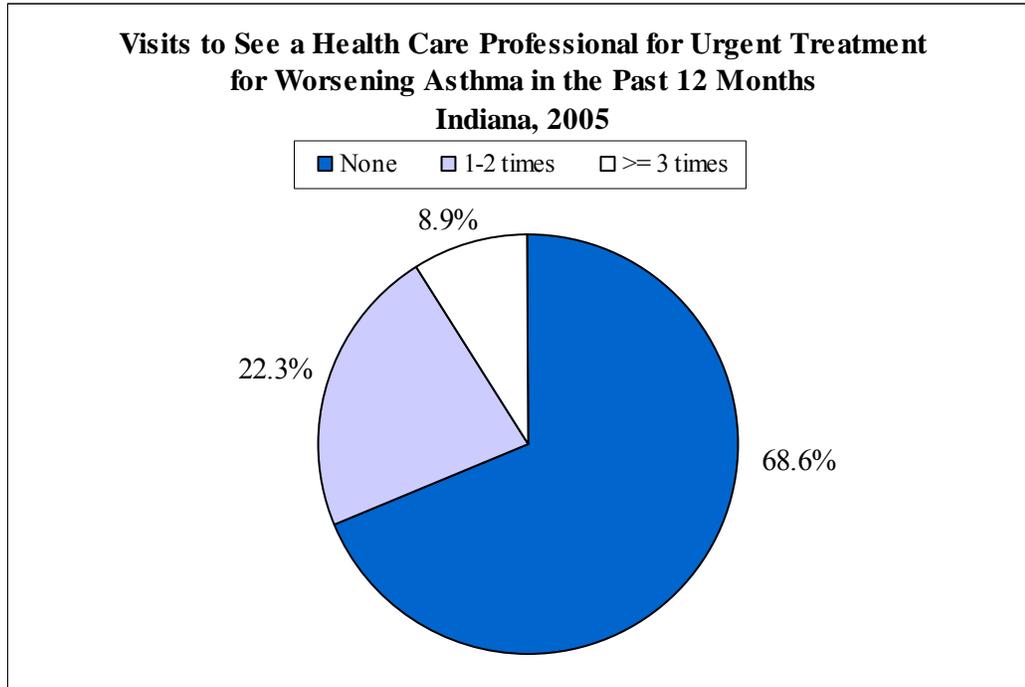
**Figure 12**

Source: Indiana BRFSS

***Number of Visits to See a Health Care Professional for Urgent Treatment for Worsening Asthma (does not include emergency room visits)***

In addition to emergency room visits, approximately 31% of adults with current asthma visited a health care professional for urgent treatment one or more times for worsening asthma symptoms in the past 12 months (Figure 13).

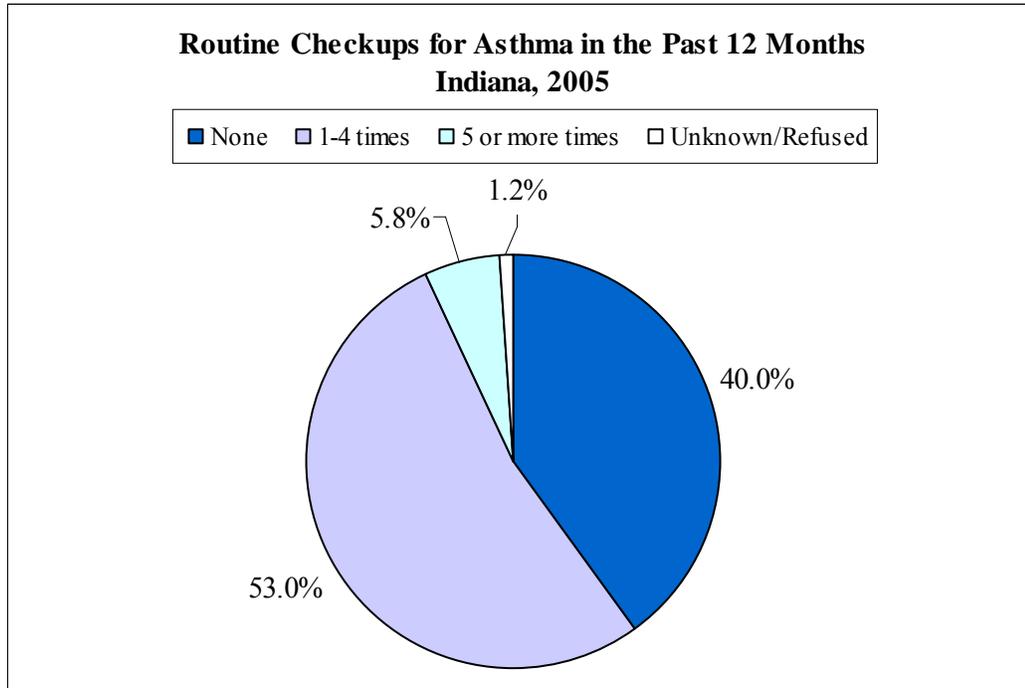
**Figure 13**



Source: Indiana BRFSS

***Number of Routine Checkups for Asthma During Past 12 Months***

Approximately 40% of adults with current asthma had not had a routine checkup for asthma in the past 12 months. Fifty-three percent reported one to four routine checkups and 5.8% reported five or more checkups (Figure 14).

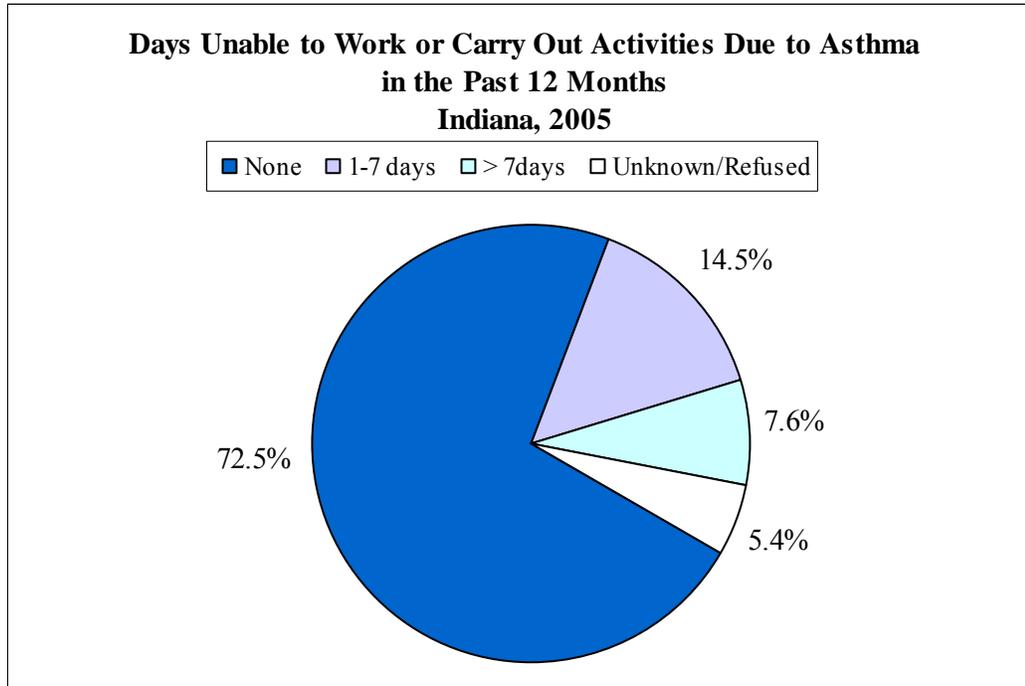
**Figure 14**

Source: Indiana BRFSS

### Number of Days Unable to Work or Carry Out Usual Activities During Past 12 Months

During the past 12 months, approximately 22.1% adults with current asthma reported having at least one day where they were unable to work or carry out usual activities because of their asthma (14.5% reported 1-7 days and 7.6% reported more than 7 days). See Figure 15.

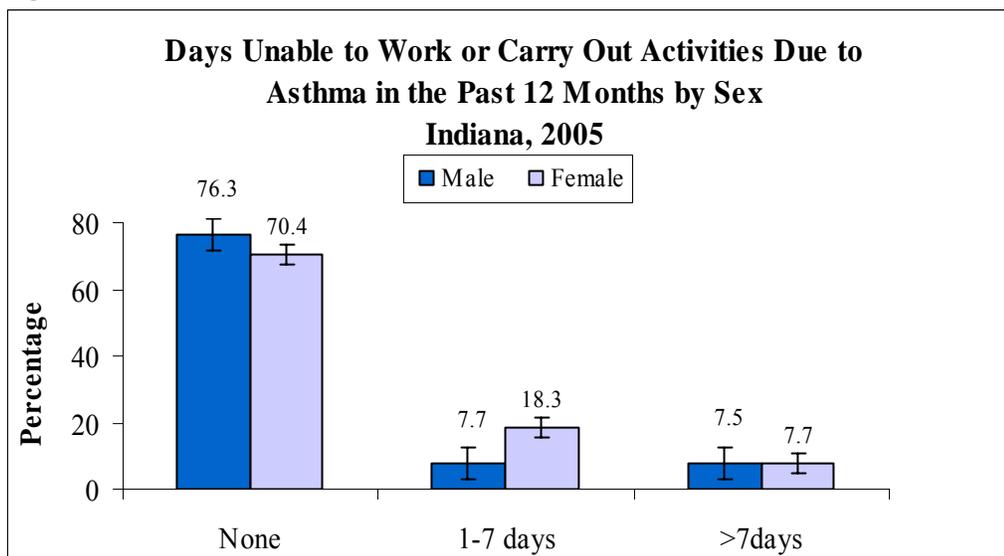
**Figure 15**



Source: Indiana BRFSS

Females reported more often than males being unable to work or carry out usual activities for one to seven days (Figure 16). The difference was statistically significant.

**Figure 16**

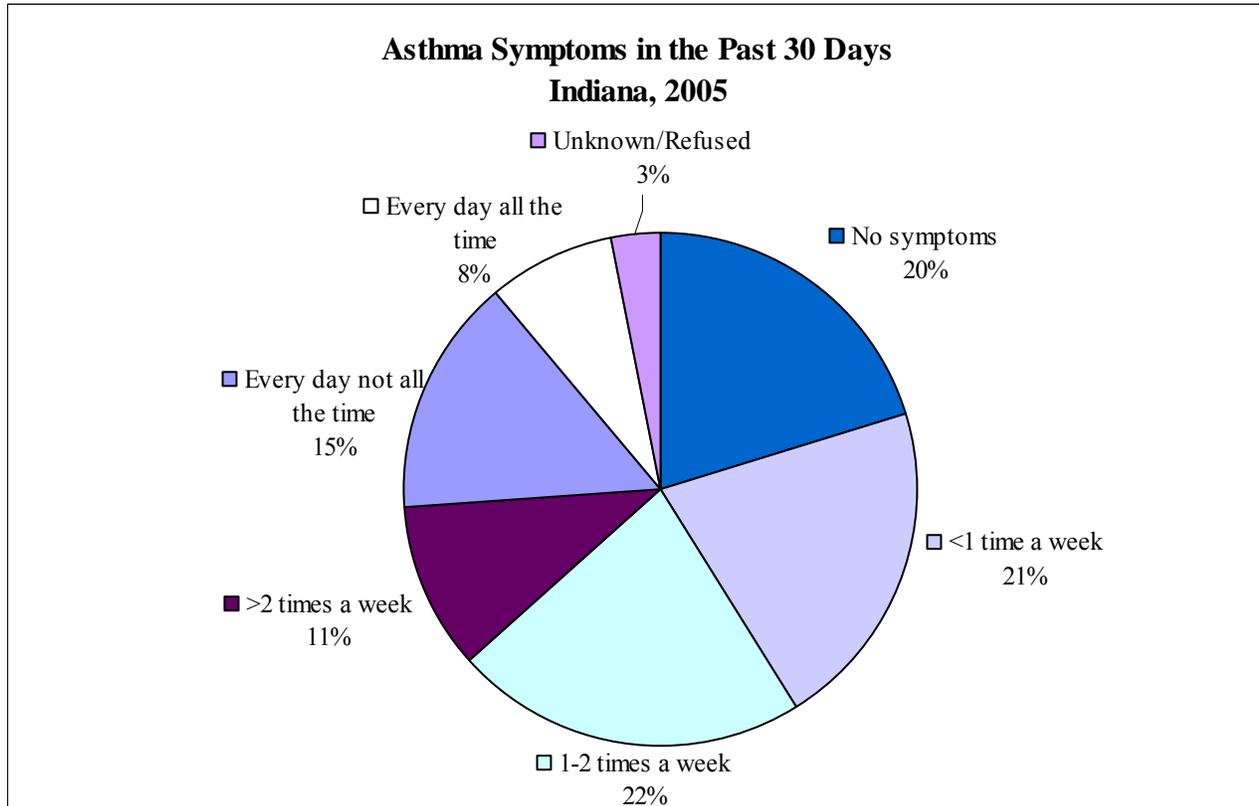


Source: Indiana BRFSS - error bars represent 95% confidence intervals

### *Frequency of Asthma Symptoms During Past 30 Days*

During the past 30 days, 33% of adults with current asthma reported having symptoms one or more times a week, but not every day (Figure 17). Additionally, 8% reported having symptoms every day, all the time.

**Figure 17**



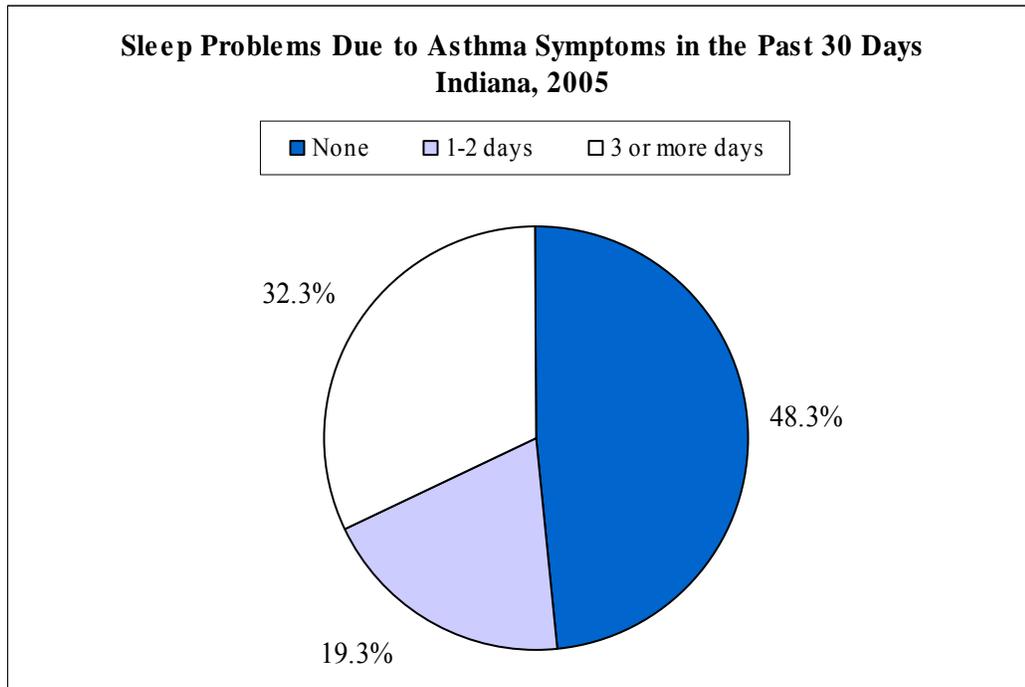
Source: Indiana BRFSS

Income level and education appear to have a relationship with asthma symptoms within the past 30 days. As the income level increases, the percentage of people reporting no asthma symptoms increases. Unfortunately, confidence intervals for this trend were too large to reliably determine significance. Similarly for education, the percentage of people reporting no asthma symptoms increases as education level increases. Confidence intervals for education were determined, but did not show a significant difference.

***Frequency of Sleep Difficulties During Past 30 Days***

During the past 30 days, 48.3% of adults with current asthma having symptoms during the past month did not have any days where asthma symptoms made it difficult to stay asleep (Figure 18).

Approximately 32% of adults reported three or more days of difficulty staying asleep due to asthma symptoms.

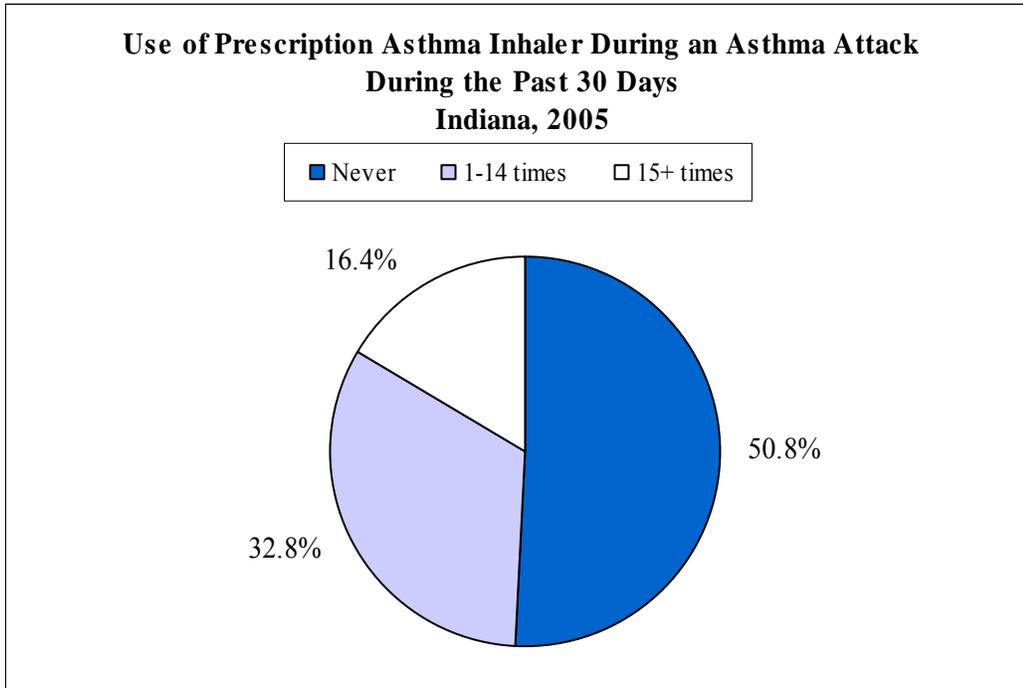
**Figure 18**

Source: Indiana BRFSS

### *Frequency of Inhaler Use for an Asthma Attack During the Past 30 Days*

During the past 30 days, 50.8% of adults with current asthma did not have an asthma attack or did not use a prescription inhaler during an asthma attack (Figure 19). In addition, 16.4% of adults used a prescription inhaler 15 or more times during the past 30 days while having an asthma attack.

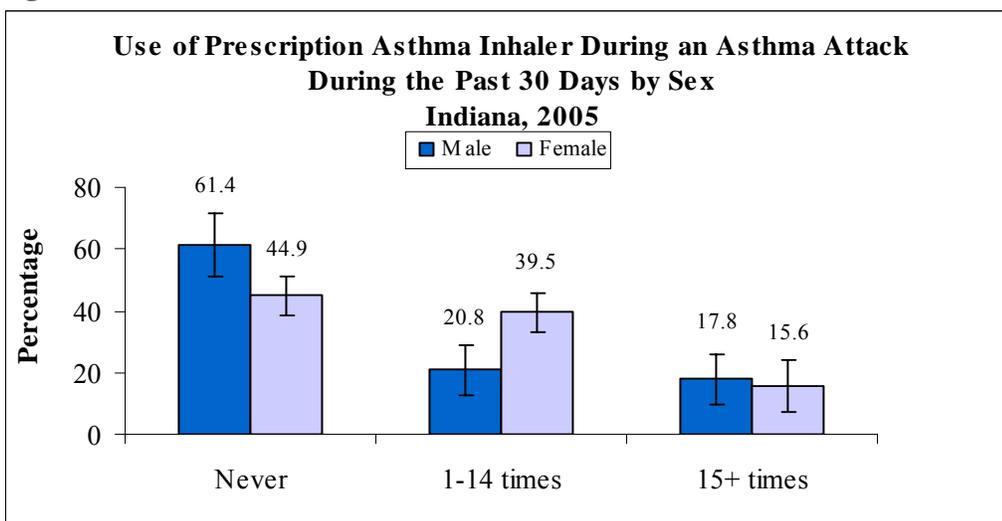
**Figure 19**



Source: Indiana BRFSS

When comparing male and female prescription inhaler use to stop an asthma attack, significantly more males report never using their inhaler in the past 30 days. Significantly more females reported using their inhaler 1-14 times in the past 30 days (Figure 20).

**Figure 20**



Source: Indiana BRFSS

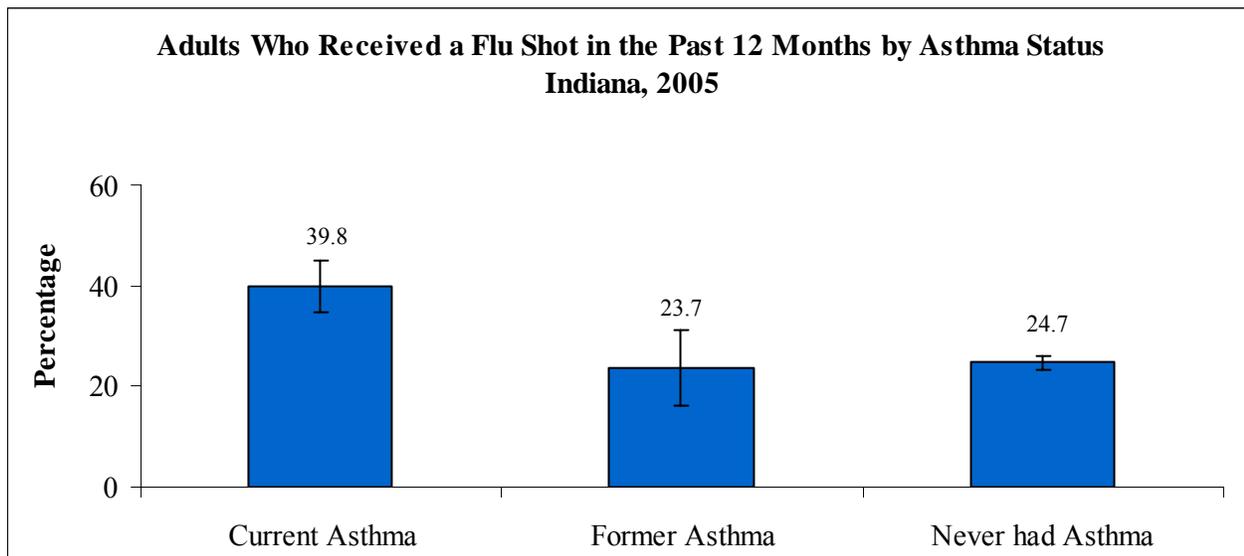
## Asthma Management: Risk Behaviors and Quality of Life

### *Asthma and Flu Shot*

Certain groups of people, including adults and children with asthma, have a higher risk of having severe complications from influenza or a higher risk for influenza-associated visits to a clinic, emergency room, or hospital. For this reason, the Centers for Disease Control and Prevention (CDC) recommends that people with asthma receive an annual influenza (flu) shot (3).

As shown in Figure 21, adults with current asthma were significantly more likely to have received a flu shot (39.8%) than adults formerly with asthma (23.7%) and adults who never had asthma (24.7%). However, 60.2% of adults who currently have asthma reported not receiving a flu shot.

**Figure 21**



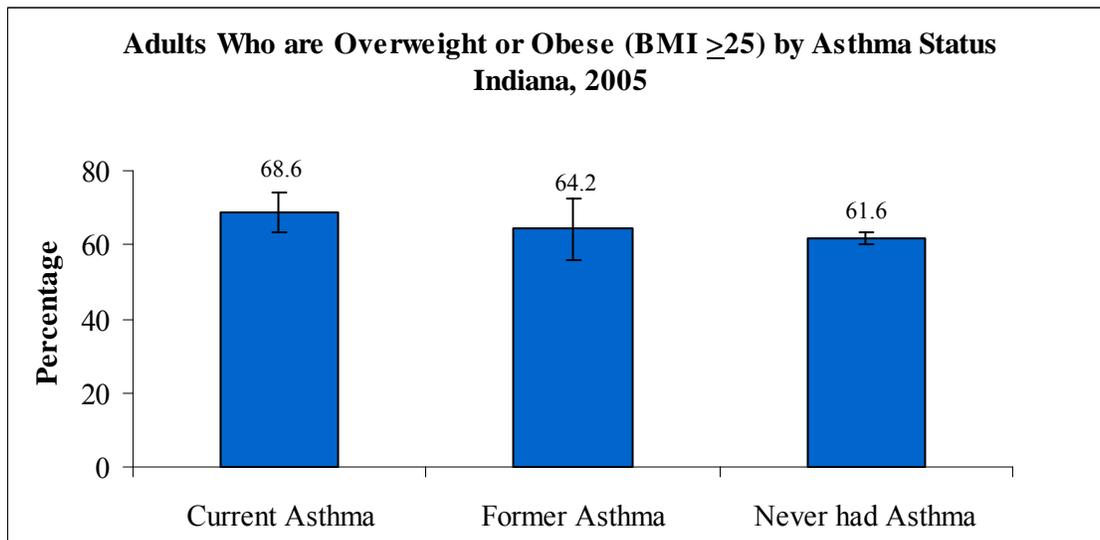
Source: Indiana BRFSS - error bars represent 95% confidence intervals

### ***Obesity and Asthma***

Research suggests a connection between asthma and obesity. The exact nature of this connection is not clear. Body Mass Index (BMI) is related to body fat. It is a tool for indicating weight status for all individuals (except children younger than two). A BMI of 25-29.9 is considered overweight and a BMI  $\geq 30$  is considered obese for adults (4).

A significantly higher percentage of adults (about two thirds) were overweight or obese, regardless of asthma status. See Figure 22. The percentage of overweight and obese (BMI  $\geq 25$ ) adults with current asthma (68.6%) was higher compared to people who formerly had asthma (64.2%) and people who never had asthma (61.6%). However, the difference was not statistically significant.

**Figure 22**



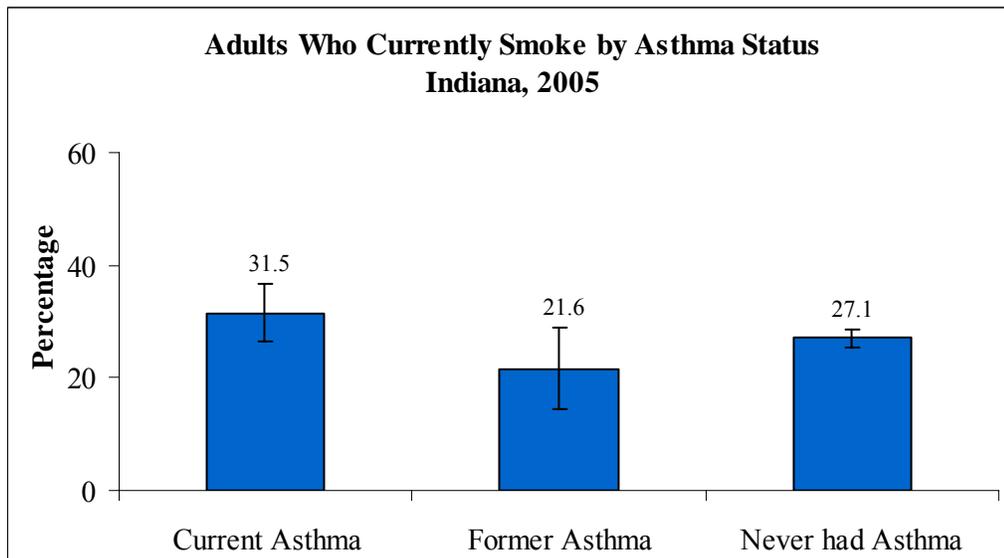
Source: Indiana BRFSS - error bars represent 95% confidence intervals

### Tobacco Use

Some people with asthma smoke, making control of their disease very difficult. People with asthma who smoke risk making their existing asthma symptoms worse and increasing the number of attacks that they experience.

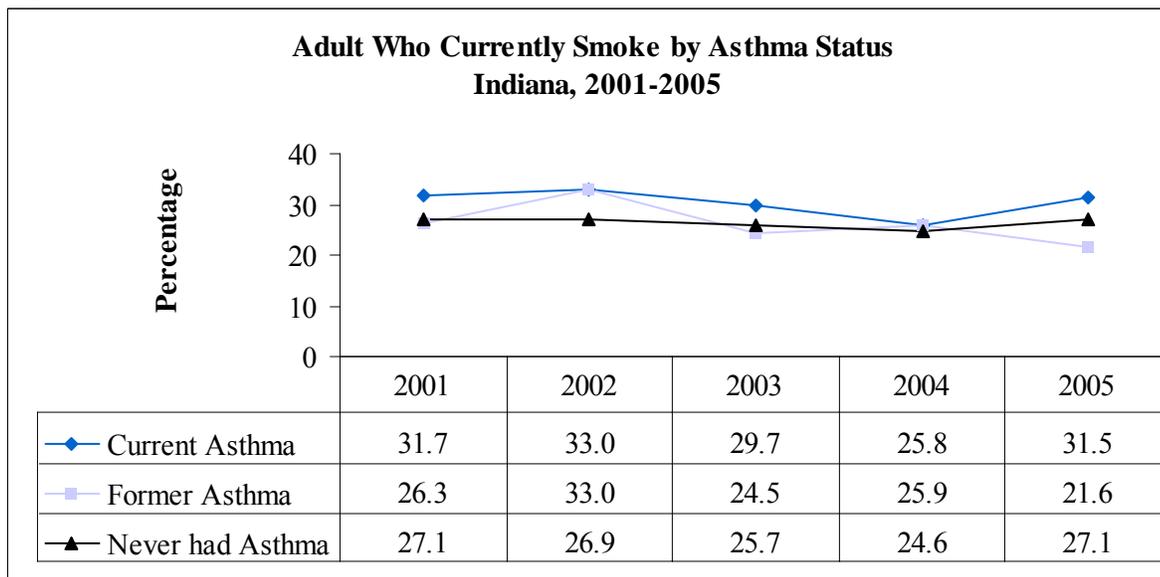
Though 31.5% of adults with current asthma are current smokers, this was not a significant difference when compared to current smokers who formerly had asthma (21.6%) and never had asthma (27.1%). See Figure 23. The percentage of adults with current asthma that are also current smokers has been relatively stable since 2001. Differences between the percentages of current smokers by asthma status since 2001 have not been statistically significant (Figure 24).

**Figure 23**



Source: Indiana BRFSS - error bars represent 95% confidence intervals

**Figure 24**

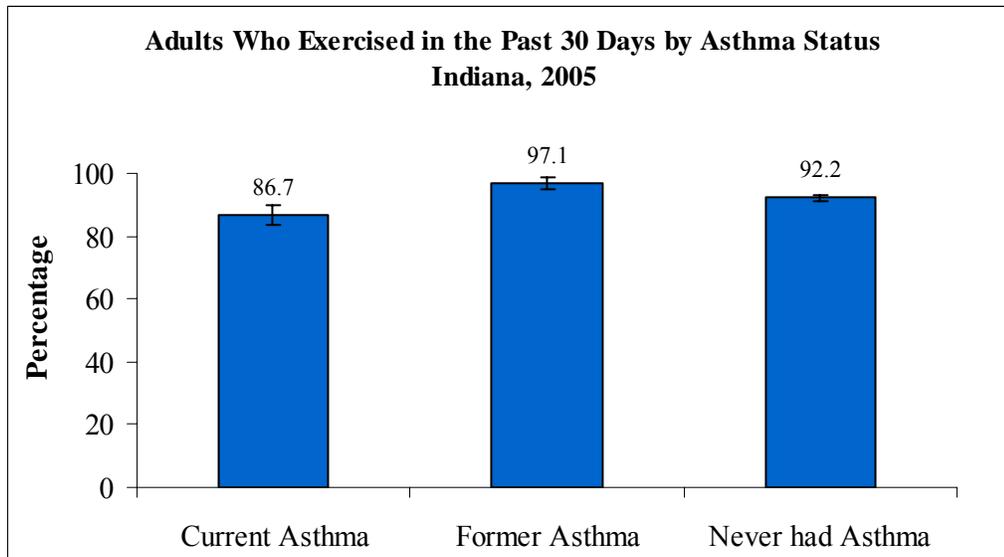


Source: Indiana BRFSS - error bars represent 95% confidence intervals

***Exercise in the Past 30 Days***

Exercise can be a trigger for asthma. People with asthma should consult with their physician to determine a plan for controlling their asthma while they are physically active. Having asthma is not a reason to avoid being physically active.

Adults with current asthma were less likely to have reported exercising in the past 30 days (86.7%) than adults formerly having asthma (97.1%) and adults without asthma (92.2%). The difference was statistically significant (Figure 25).

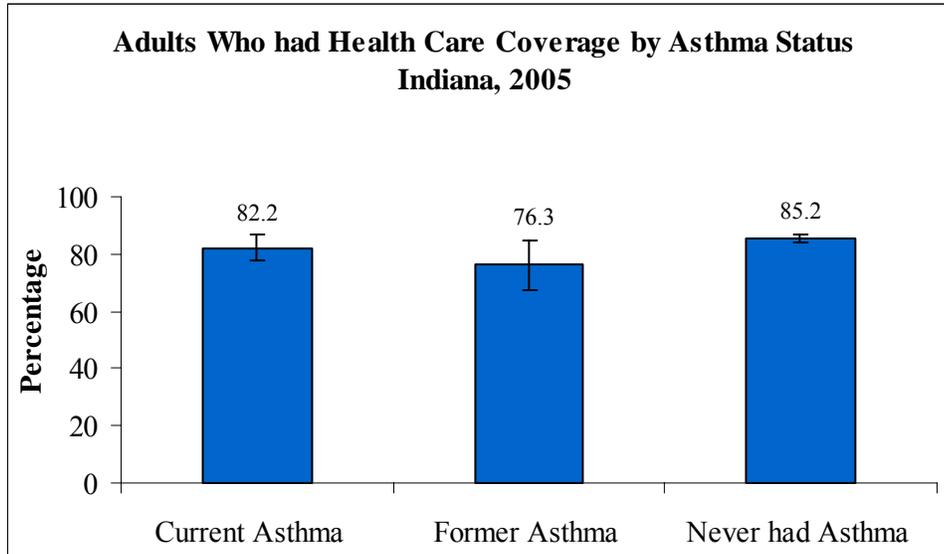
**Figure 25**

Source: Indiana BRFSS - error bars represent 95% confidence intervals

### Health Care Coverage

More than 80% of adults with current asthma reported having health care coverage. This percentage, though not statistically significant, is higher when compared to adults who formerly had asthma (76.3%), and similar to adults who never had asthma (85.2%). See Figure 26.

**Figure 26**

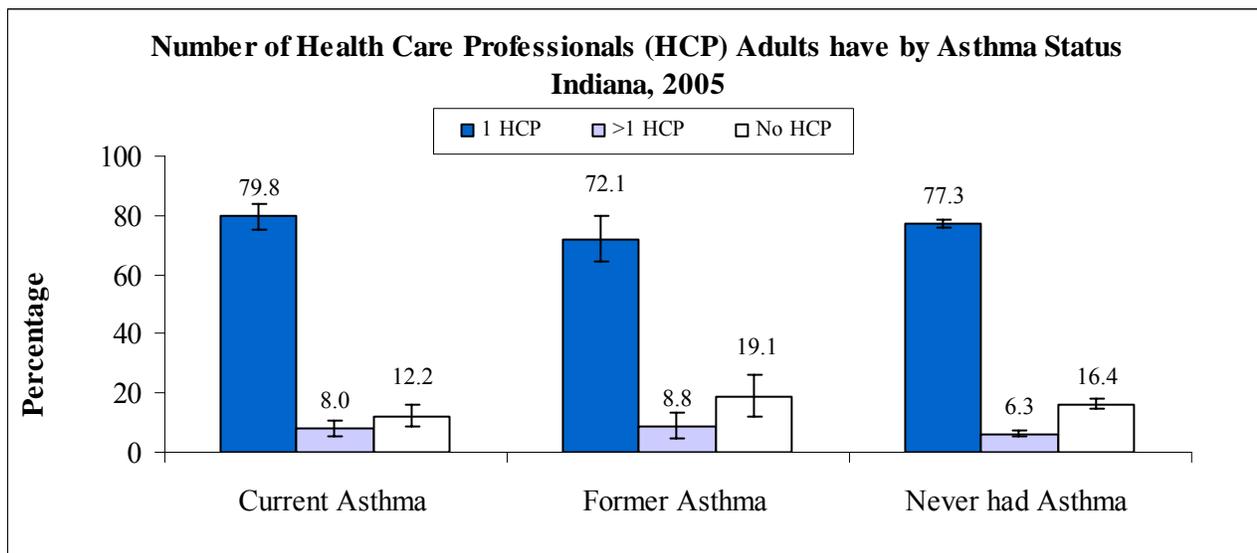


Source: Indiana BRFSS - error bars represent 95% confidence intervals

### Number of Health Care Providers

Almost 80% of adults with current asthma reported having at least one health care professional (HCP). This is slightly more than those adults who reported formerly having asthma (72.1%) and adults who never had asthma (77.3%). However, 12.2% of adults with current asthma reported not having any health care professionals. There were no statistical differences by asthma status for having one or more HCP. See Figure 27.

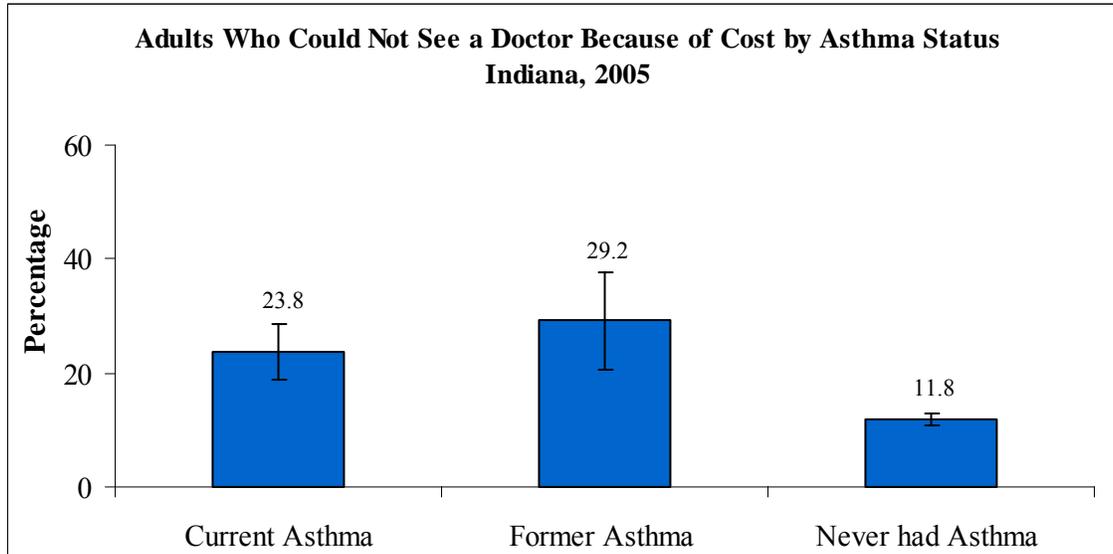
**Figure 27**



Source: Indiana BRFSS - error bars represent 95% confidence intervals

***Seeing a Doctor versus Cost***

Adults with current asthma were twice as likely to report not seeing a doctor because of cost compared to those adults who never had asthma (23.8% vs. 11.8%, respectively). The difference was statistically significant. See Figure 28.

**Figure 28**

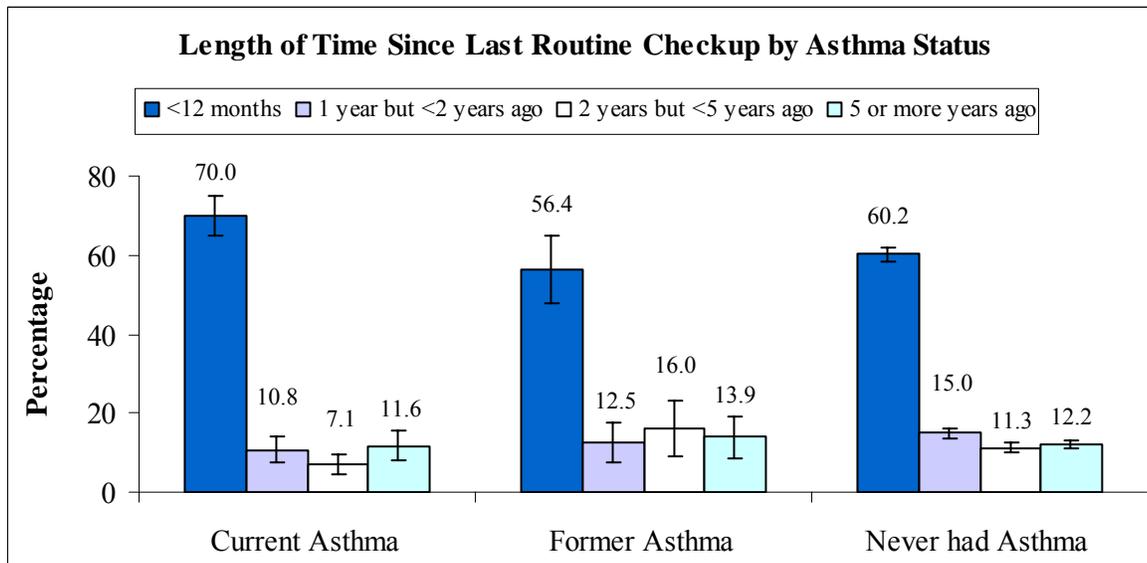
Source: Indiana BRFSS - error bars represent 95% confidence intervals

### *Seeing a Doctor for a Routine Visit*

Adults with current asthma were more likely to visit a physician for a routine checkup within the past 12 months (70%) than adults formerly with asthma (56.4%) and adults who had never had asthma (60.2%). The difference was statistically significant. See Figure 29.

Adults who formerly had asthma were most likely to have visited a physician for a routine checkup within the past 2 years but < 5 year ago (16.0%) compared to adults with current asthma (7.1%) and adults who never had asthma (11.3%). The difference was statistically significant between adults with current asthma and adults who never had asthma. See Figure 29.

**Figure 29**



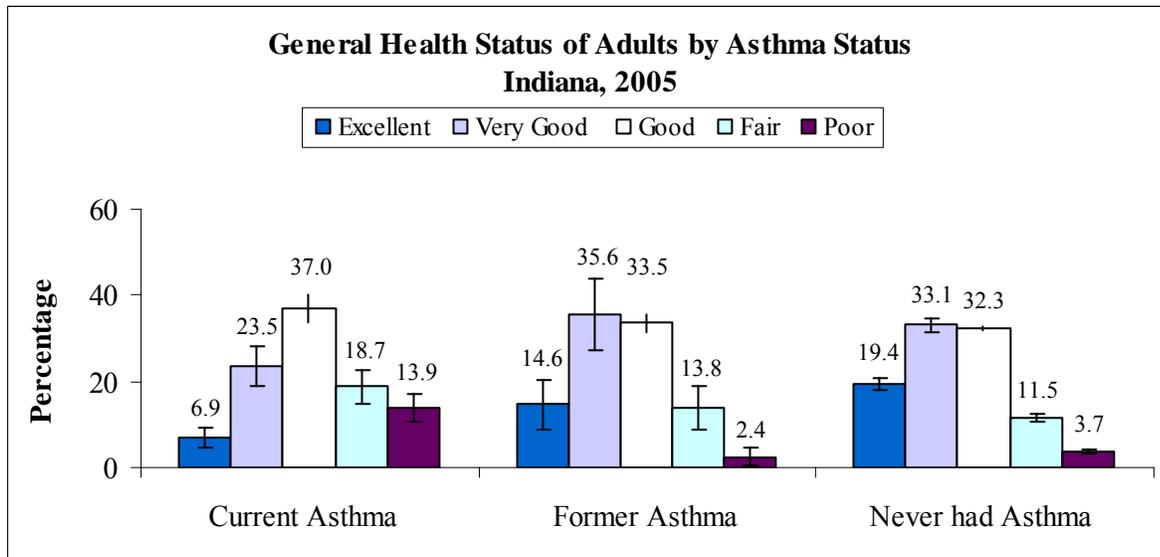
Source: Indiana BRFSS - error bars represent 95% confidence intervals

### ***General Health Status of Adults with Asthma***

Adults with current asthma reported the lowest “excellent” or “very good” health status (6.9% and 23.5%, respectively) compared to adults who never had asthma (19.4% and 33.1%, respectively). The difference was statistically significant. See Figure 30.

Adults with current asthma reported a “fair” or “poor” health status (18.7% and 13.9%, respectively) more often compared to adults who never had asthma (11.5% and 3.7%, respectively). These differences were also statistically significant. See Figure 30.

**Figure 30**



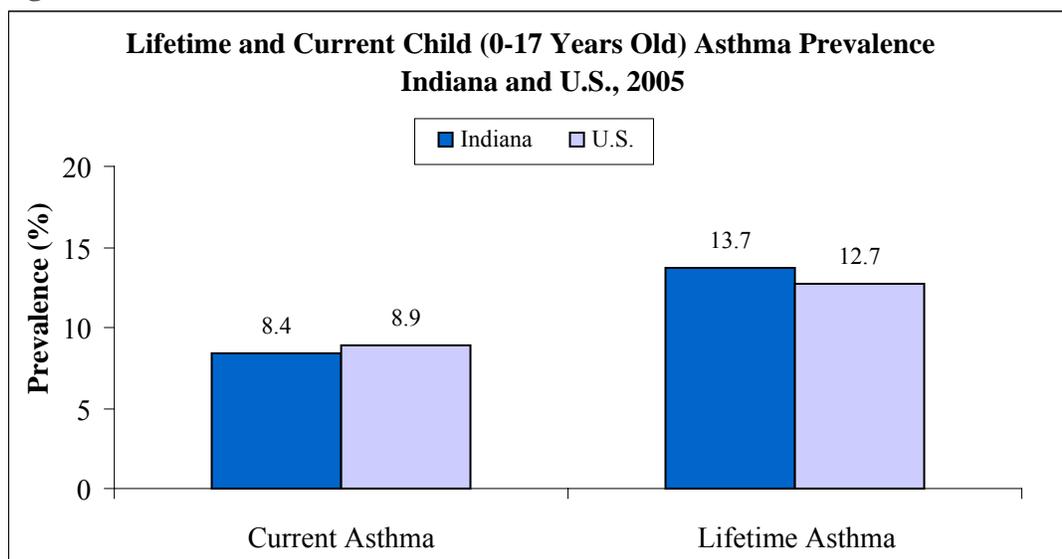
Source: Indiana BRFSS - error bars represent 95% confidence intervals

### **Child Asthma Prevalence**

Asthma is a leading chronic disease among children. Asthma can have a tremendous impact on a child's health (hospitalization, emergency room visits), quality of life (difficulty sleeping, activity restrictions), and school attendance and performance. Because of the heavy burden asthma places on children, parents, caregivers, and the health care system, it is important to study trends in childhood asthma prevalence in Indiana.

According to the 2005 Indiana BRFSS, an estimated 140,000 Hoosier children currently have asthma. The current asthma prevalence among children (17 and younger) in Indiana was 8.4% (Figure 31). The national prevalence of current asthma among children was 8.9%. The lifetime asthma prevalence among children in Indiana was 13.7% and the national prevalence was 12.7%.

**Figure 31**



Source: 2005 IN BRFSS & 2005 National Health Interview Survey (NHIS), CDC, NCHS.  
Current and lifetime prevalence for Indiana include unknown ages, but are known to be less than 18 years old.

When both current and lifetime asthma prevalence for Indiana children were analyzed by sex and age (10 and under, 11-17), no significant differences were seen between groups. Table 1 provides specific prevalence data for reference.

**Table 1: Lifetime and Current Child (0-17 Years Old) Asthma Prevalence by Sex and Age Groups - Indiana, 2005**

	<b>Current Asthma</b>	<b>Lifetime Asthma</b>
<b>All Children</b>	8.4%	13.7%
Males	8.7%	15.2%
Females	8.2%	12.8%
<b>Age: 10 &amp; Under</b>	9.9%	13.6%
Age: 11-17	9.5%	14.7%

Source: 2005 IN BRFSS

Nationally, males have a higher prevalence of current asthma until about 15 years of age. Between 15 and 17 years, the female prevalence for current asthma surpasses that of males and continues through adulthood. The national statistics for current child asthma prevalence by age show increasing prevalence with increasing age. The asthma prevalence for ages 0-4 is 6.2% and increases to 9.3% for ages 5-10 and 10.0% for ages 11-17 (5).

Due to small sample size, current and lifetime asthma prevalence for children in Indiana by race/ethnicity are not stable and therefore are not presented. Nationally, asthma was most prevalent among non-Hispanic black (12.8% current asthma prevalence) and Puerto Rican (19.2% current asthma prevalence) children. Asian children have the lowest reported current asthma prevalence rate at 4.9% and non-Hispanic whites have a current asthma prevalence rate of 7.9% (5).

## ASTHMA HOSPITALIZATIONS

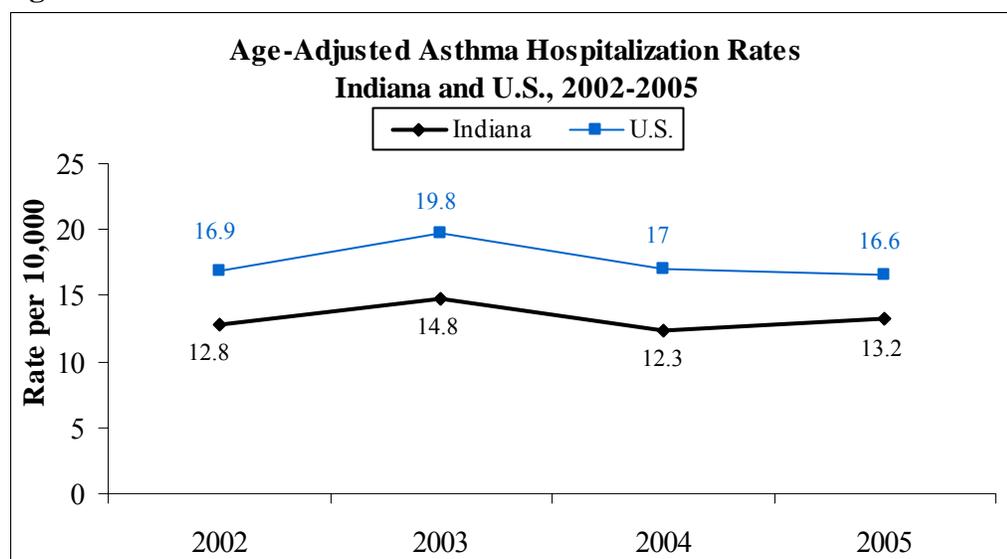
Asthma hospitalization data can be used to look at the severity of asthma. Hospitalizations due to asthma are generally considered preventable if asthma is controlled. Proper disease management can be achieved with medications, reduced exposure to triggers, and regular outpatient visits to health care providers. These services also tend to be less costly than hospitalizations. Asthma hospitalizations are very costly.

Hospital discharge data are collected by the Indiana Hospital Association. From 1997 to 2001, individual level data were not routinely supplied to the Indiana State Department of Health (ISDH). The Indiana Hospital Association provided aggregate data from their members. However, during that time not all hospitals were members of the Indiana Hospital Association. Starting in 2002, state law required all hospitals to report individual level hospitalization data to the ISDH. For this reason, data from years before 2002 cannot be compared to the years 2002 onward. The Asthma Program will use 2002 as the baseline year for comparing hospitalization data.

For this report, the unit of analysis is the discharge event, not the patient. An asthma discharge is one in which there is a primary diagnosis of asthma (ICD-9 Codes 493.0 – 493.9). Patient identifiers have been removed from this database. The number of hospitalizations is not the same as the number of people hospitalized for asthma, as some people may have been hospitalized more than once during the year. Only hospitalizations for Indiana residents who were admitted to Indiana hospitals are included in this report. The database contains information on all discharges, regardless of payer status including discharges of patients without insurance coverage.

There were 8,302 hospitalizations due to asthma in 2005. The age-adjusted rate per 10,000 Indiana residents changed from 12.8 in 2002 to 13.2 in 2005. Indiana's hospitalization rate is lower than the national rate (Figure 32). Both rates have been relatively steady from 2002 to 2005.

**Figure 32**



Source: ISDH, Chronic Disease Epidemiology and National Center for Health Statistics, National Hospital Discharge Survey, 1979-2005

There are 92 counties in Indiana. The number of asthma hospitalizations was greatest for Marion County (1,338) and lowest for Union and Warren counties (< 5). The 10 counties with the greatest number of asthma hospitalizations can be seen in Table 2.

Wells County had the highest age-adjusted asthma hospitalization rate per 10,000 Indiana residents at 26.3 per 10,000. Boone County had the lowest rate at 6.8 per 10,000. Seventeen counties did not have a reportable rate because of the small number of asthma hospitalizations in the county. The 10 counties with the highest asthma hospitalization rates can be seen in Table 3. Asthma hospitalizations and age-adjusted asthma hospitalization rates by county for the entire state can be seen in Appendix C.

**Table 2: Top 10 Indiana Counties with the Greatest Number of Asthma Hospitalizations  
Indiana, 2005**

County	Number of Asthma Hospitalizations
Marion	1,338
Lake	1,096
Allen	350
St. Joseph	350
Madison	241
Porter	239
Delaware	227
Elkhart	203
La Porte	179
Grant	165

Source: ISDH, Chronic Disease Epidemiology

**Table 3: Top 10 Indiana Counties with the Highest Asthma Hospitalization Rates  
Indiana, 2005**

County	Age-Adjusted Asthma Hospitalization Rate (per 10,000)
Wells	26.3
Huntington	24.6
Fulton	22.8
Grant	22.4
Lake	21.8
Delaware	20.8
Jefferson	19.6
Shelby	19.1
Blackford	19.1
Clay	18.9

Source: ISDH, Chronic Disease Epidemiology

The number and rate of asthma hospitalizations were higher for females than males. In 2005, out of the 8,302 hospitalizations for asthma, 65.4% (5,430) were female and 34.6% (2,872) were male. The age-adjusted rate was 16.4 per 10,000 for females and 9.4 per 10,000 for males.

Due to the manner in which race/ethnicity were collected (hospital staff assign race/ethnicity for the patient) the rates for blacks and whites were more reliable to calculate and report than rates for "Other." In 2005, of those persons hospitalized for asthma, 72.4 % were white, 17.7% were black and 9.9% were "Other." The asthma hospitalization rate for blacks was almost three times higher than the rate for whites (27.6 per 10,000 vs. 10.6 per 10,000).

The number and rate of asthma hospitalizations were higher for females than males regardless of race. White females had the highest number (4,051) and percentage (48.8 %) of asthma hospitalizations, which is almost half of all inpatient hospitalizations for asthma (Table 4).

**Table 4: Number and Percentage of Asthma Hospitalizations by Sex and Race/Ethnicity Indiana, 2005**

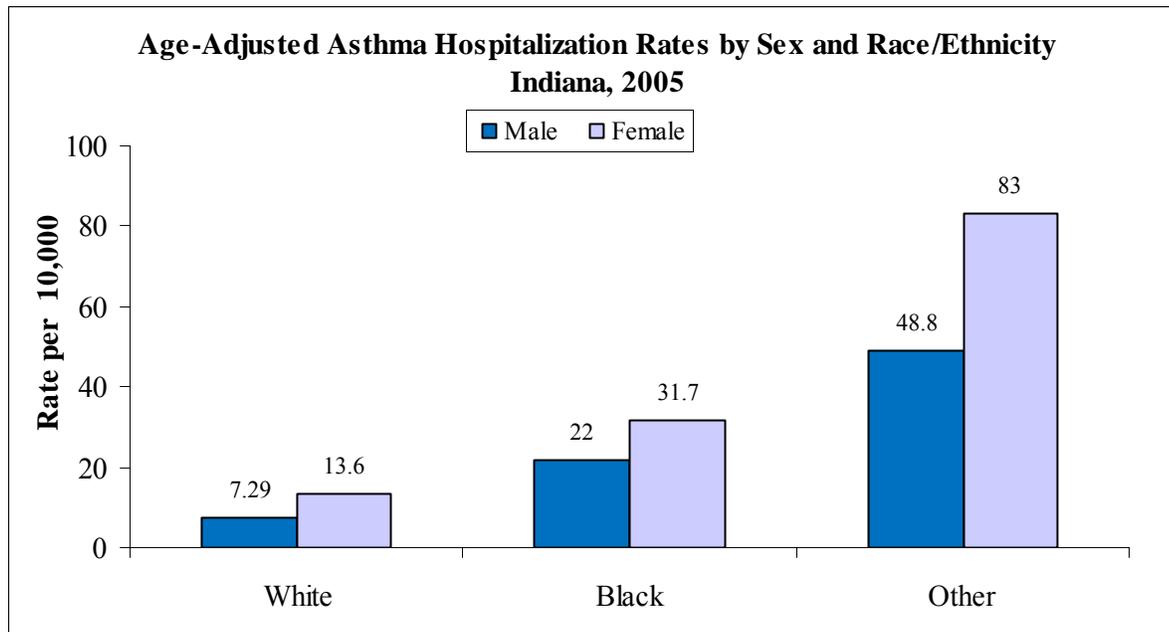
	White		Black		Other	
	Number of Asthma Hospitalizations	% of Asthma*	Number of Asthma Hospitalizations	% of Asthma*	Number of Asthma Hospitalizations	% of Asthma*
<b>Male</b>	1,960	23.6%	605	7.3%	307	3.7%
<b>Female</b>	4,051	48.8%	864	10.4%	515	6.2%
<b>Total</b>	6,011	72.4%	1,469	17.7%	822	9.9%

Source: ISDH, Chronic Disease Epidemiology

\* Denominator = to total of hospitalizations due to asthma (8,302)

“Other” females had the highest asthma hospitalization rate at 83 per 10,000 when compared to blacks and whites by sex. However, the rate for “Other” is unreliable because of several factors that could include a small sample size or missing data. This rate is not informative since it is not more specific in identifying which races/ethnicities make up this category. When comparing blacks and whites, black males’ and black females’ asthma hospitalization rates were approximately three times higher than the rates for white males and females (Figure 33). Black females had the highest asthma hospitalization rate (31.7 per 10,000).

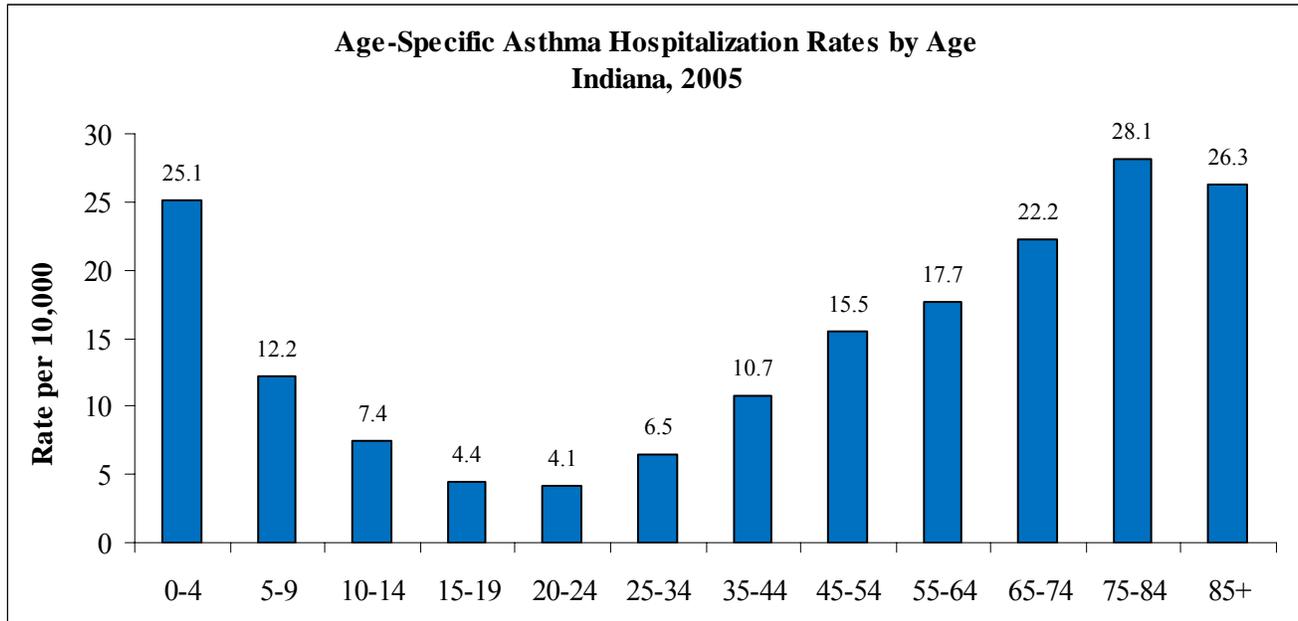
**Figure 33**



Source: ISDH, Chronic Disease Epidemiology

Asthma hospitalization rates differed by age group. Adults aged 75-84 had the highest hospitalization rate (28.1 per 10,000). Adults aged 85 years and older and children ages 0-4 had the next two highest asthma hospitalization rates in 2005 (Figure 34). As children grew older asthma hospitalization rates decreased; however, starting at ages 25-34 as people grew older, the asthma hospitalization rate increased.

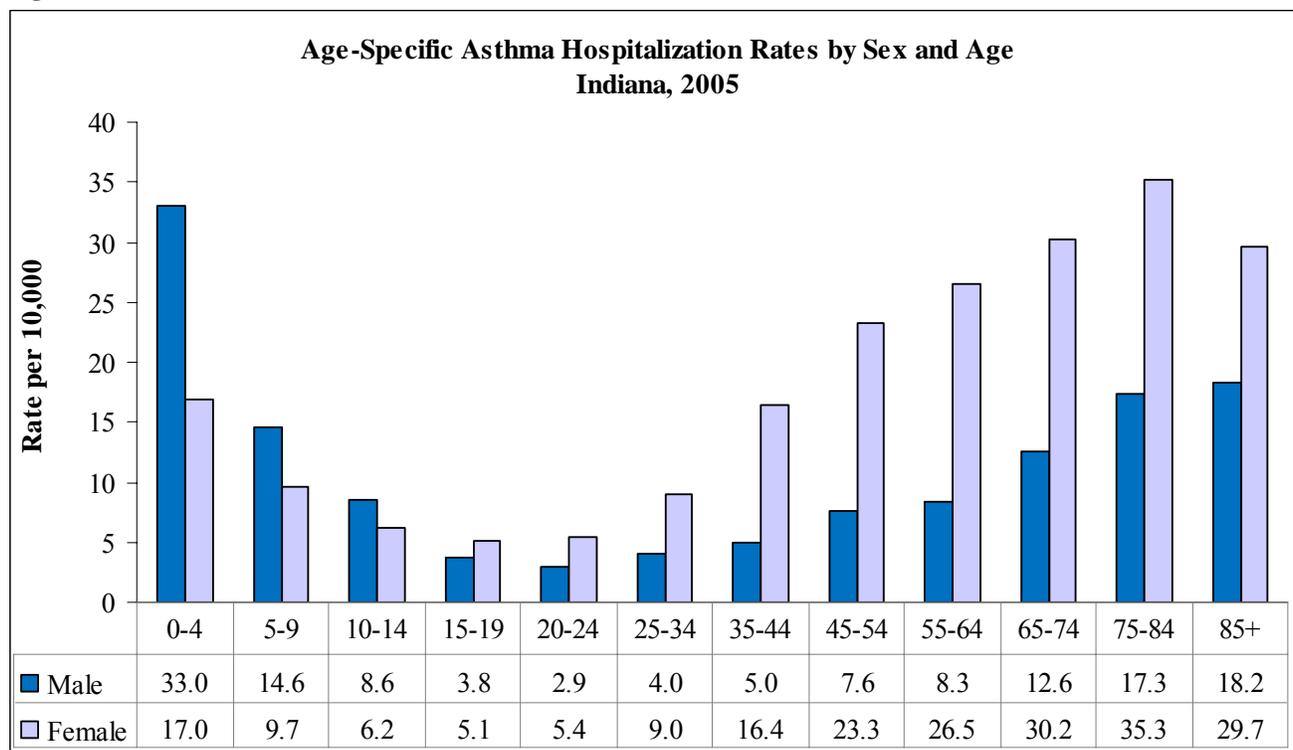
**Figure 34**



Source: ISDH, Chronic Disease Epidemiology

Among children, asthma hospitalization rates for males were higher than for females. However, between the ages of 15 and 19 the asthma hospitalization rate for females was higher than for males. This difference between females and males continued through adulthood with females having a higher asthma hospitalization rate than did males (Figure 35).

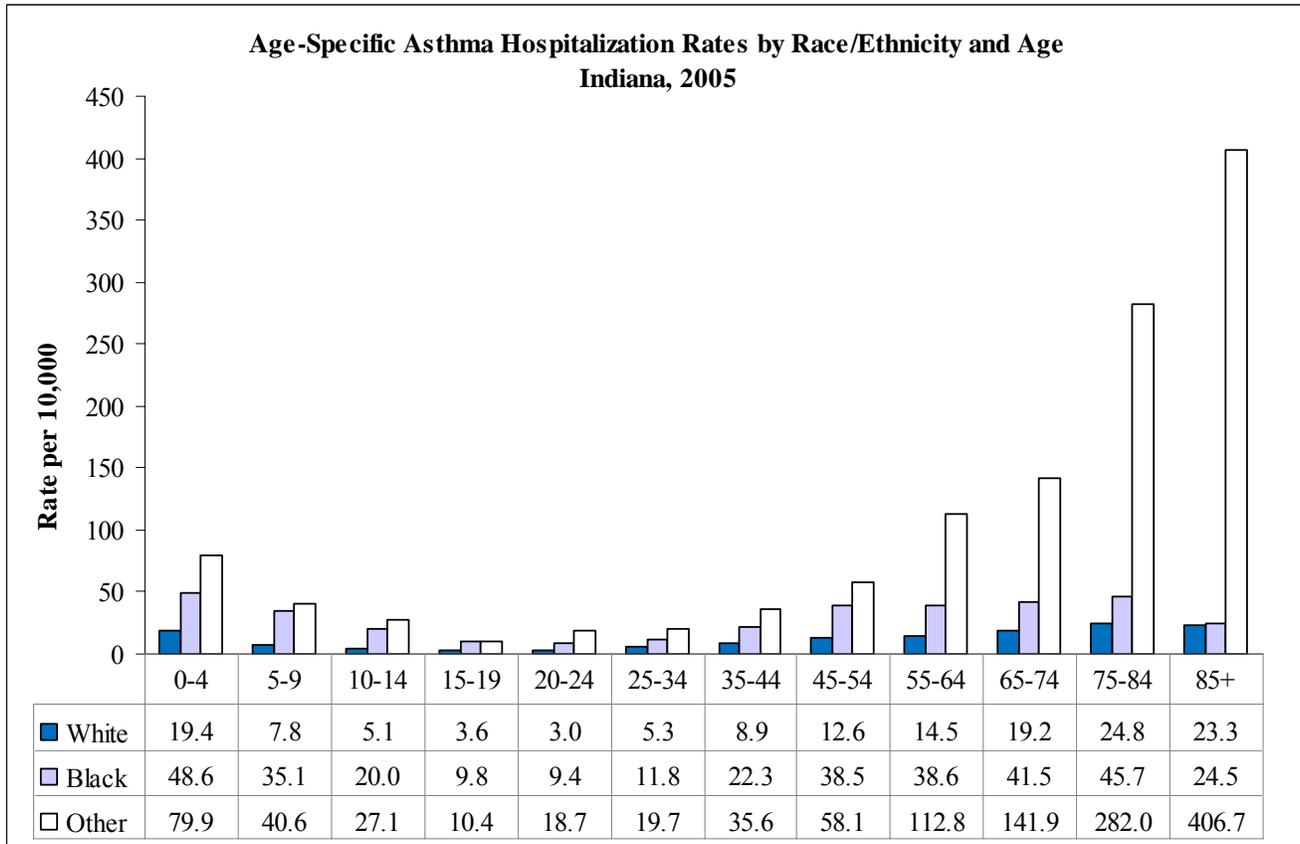
**Figure 35**



Source: ISDH, Chronic Disease Epidemiology

“Other” races/ethnicities had the highest asthma hospitalization rates for all age groups when compared to whites and blacks (Figure 36). However, the rate for “Other” is unreliable because of several factors that could include a small sample size or missing data. This rate is not informative since it is not more specific in identifying which races and ethnicities make up this category. The asthma hospitalization rate for blacks was higher for all age groups when compared to whites, only.

**Figure 36**

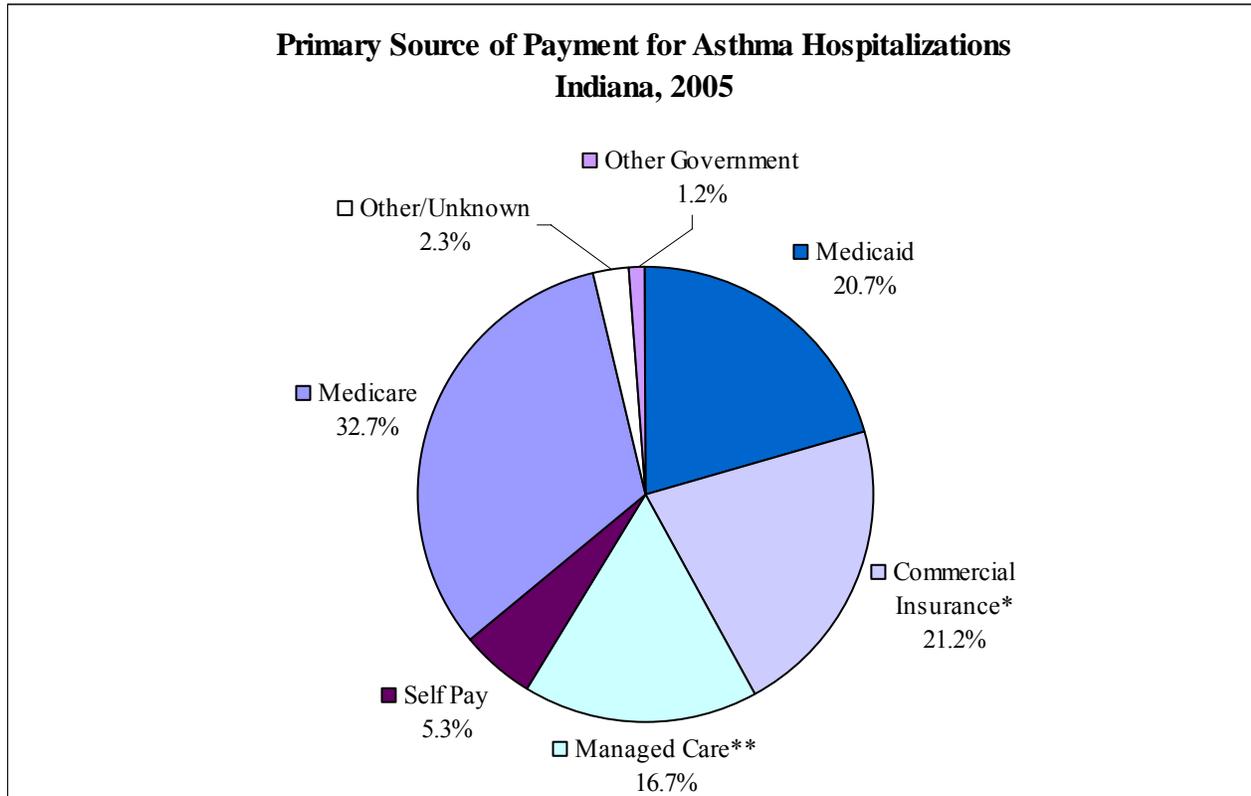


Source: ISDH, Chronic Disease Epidemiology

**Hospitalizations: Primary Source of Payment**

Total inpatient charges were \$73,482,966 for 8,302 hospitalizations with a primary discharge diagnosis of asthma, resulting in an average cost of \$8,851 per asthma hospitalization. As seen in Figure 37, the largest percentage of asthma hospitalization charges were charged to Medicare (32.7%) due to the age distribution among hospitalizations (23.3% of hospitalizations were 65 and older). The next most frequently charged payers were commercial insurance (21.2%) and Medicaid (20.7%).

**Figure 37**



Source: ISDH, Chronic Disease Epidemiology

\*This is private commercial insurance (excludes managed care)

\*\*This is private managed care insurance (non-Medicaid and non-government)

## EMERGENCY DEPARTMENT VISITS

Emergency department (ED) visits are another measure of the severity of asthma. Most ED visits are preventable with proper disease management.

ED visits are a subset of the Hospital Outpatient Discharge data collected by the Indiana Hospital Association. Outpatient Discharge data were not collected until 2002. The emergency services variable identifies which records were ED visits and which were not. For this report, only ED visits are analyzed. All ED visits are associated with a hospital. However, there are many non-hospital associated providers of other types of outpatient services and thus the Hospital Outpatient Discharge database is incomplete for those types of visits.

As with asthma hospitalization data, the unit of analysis is the ED discharge event, not the patient. Patient identifiers have been removed from the Outpatient database provided to the Indiana State Department of Health. Thus, the number of ED visits for asthma for any particular year exceeds the number of patients that visited an ED for asthma during that year, as patients may have visited the ED multiple times during a year for asthma.

Not all visits to an ED are emergencies. Patients may visit an ED when they do not have access to a private physician or to a clinic. This occurs more often with patients who lack insurance. There is a variable in the hospital data that classifies the severity of an ED visit as emergency, urgent, routine, or unknown. However, for the purposes of this report, all ED visits were analyzed together as a group.

There were 24,320 ED visits due to asthma in 2005. The age-adjusted asthma ED rate per 10,000 Indiana residents was 39.2. The number of asthma ED visits was greatest for Marion County (4,605) and lowest for Ohio County (6). The 10 counties with the greatest number of ED visits due to asthma can be seen in Table 5. Warren County had the highest age-adjusted asthma ED rate per 10,000 residents at 90.6 and Huntington County had the lowest rate at 5.5. Seven counties did not have a stable rate because of the small number of asthma ED visits in the county. The 10 counties with the highest asthma ED rates can be seen in Table 6. Asthma ED visits and age-adjusted ED rates by county for the entire state can be seen in Appendix D.

**Table 5: Top 10 Indiana Counties with the Greatest Number of Asthma Emergency Department Visits - Indiana, 2005**

County	Number of Asthma ED Visits
Marion	4,605
Lake	2,902
Vanderburgh	1,150
Elkhart	790
Allen	713
Madison	697
Hamilton	648
St. Joseph	625
Delaware	602
Tippecanoe	599

Source: ISDH, Chronic Disease Epidemiology

**Table 6: Top 10 Indiana Counties with the Highest Asthma Emergency Department Rates Indiana, 2005**

County	Age-Adjusted Asthma ED Rate (per 10,000)
Warren	90.6
Fountain	89.2
Shelby	83.7
Blackford	73.7
Jay	72
Vanderburgh	69.5
Randolph	68.6
Scott	66.6
Rush	62.7
Lawrence	62.4

Source: ISDH, Chronic Disease Epidemiology

The number and rate of asthma ED visits were higher for females than males. In 2005, out of the 24,320 ED visits for asthma, 55.8% (13,572) were females and 44.2% (10,748) were males. The age-adjusted asthma ED rate per 10,000 Indiana residents was 43.9 for females and 34.3 for males.

As with asthma hospitalizations, due to the manner in which race/ethnicity were collected (hospital staff assigned race/ethnicity for the patient) the rates for blacks and whites were more reliable to calculate and report than rates for “Other.” In 2005, of those persons who visited an ED for asthma, 63.1 % were white, 23.3% were black and 13.6% were “Other” (Table 7). The asthma ED rate for blacks was more than three times higher than the rate for whites (94.7 per 10,000 vs. 28.3 per 10,000).

The number of asthma ED visits was highest for white females (9,078), which was slightly more than one third of all ED visits for asthma (Table 7). Interestingly, black males had a slightly higher number of asthma ED visits than black females.

**Table 7: Number and Percentage of Asthma Emergency Department Visits by Sex and Race/Ethnicity - Indiana, 2005**

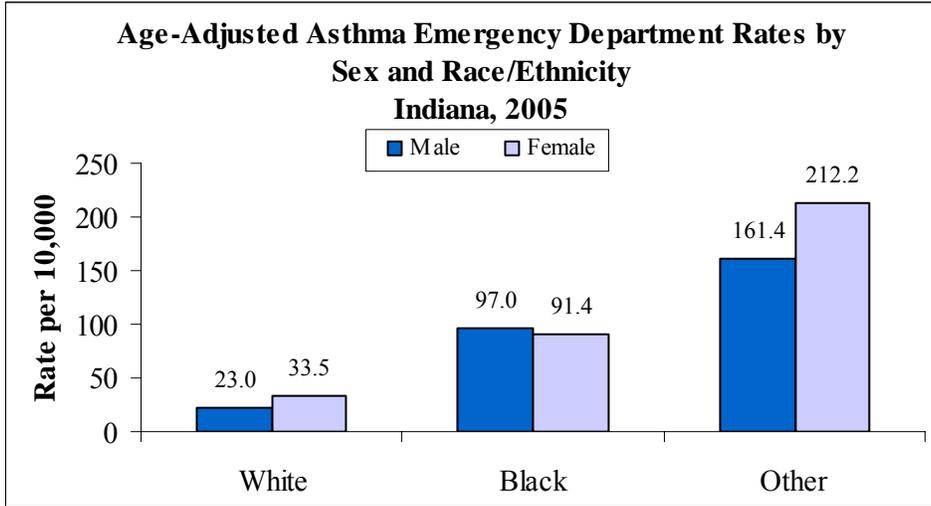
	White		Black		Other	
	Number of Asthma ED Visits	% of Asthma*	Number of Asthma ED Visits	% of Asthma*	Number of Asthma ED Visits	% of Asthma*
<b>Male</b>	6,274	25.8%	2,926	12%	1,548	6.4%
<b>Female</b>	9,078	37.3%	2,737	11.3%	1,757	7.2%
<b>Total</b>	15,352	63.1%	5,663	23.3%	3,305	13.6%

Source: ISDH, Chronic Disease Epidemiology

\* Denominator = total number of ED visits due to asthma (24,320)

“Other” females had the highest ED rate at 212.2 per 10,000 when compared to blacks and whites by sex. However, the rate for “Other” is unreliable because of several factors that could include a small sample size or missing data. This rate is not informative since it is not more specific in identifying which races/ethnicities make up this category. When comparing blacks and whites, black males’ and females’ ED rates were three to four times higher than the rates for white males and females (Figure 38). Black males had the highest ED rate (97 per 10,000) when compared to blacks and whites by sex.

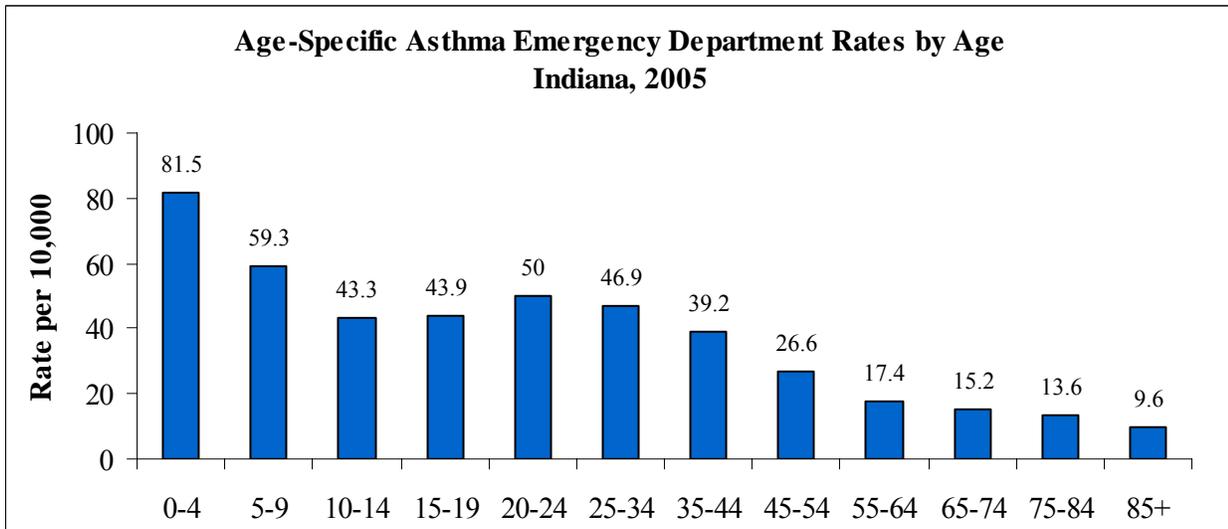
**Figure 38**



Source: ISDH, Chronic Disease Epidemiology

Asthma ED rates differed by age group. As shown in Figure 39, young children ages 0-4 had the highest asthma ED rate (81.5 per 10,000). The asthma ED rate decreased with the increase of age so that people 85 years and older had the lowest rate (9.6 per 10,000) of all age groups.

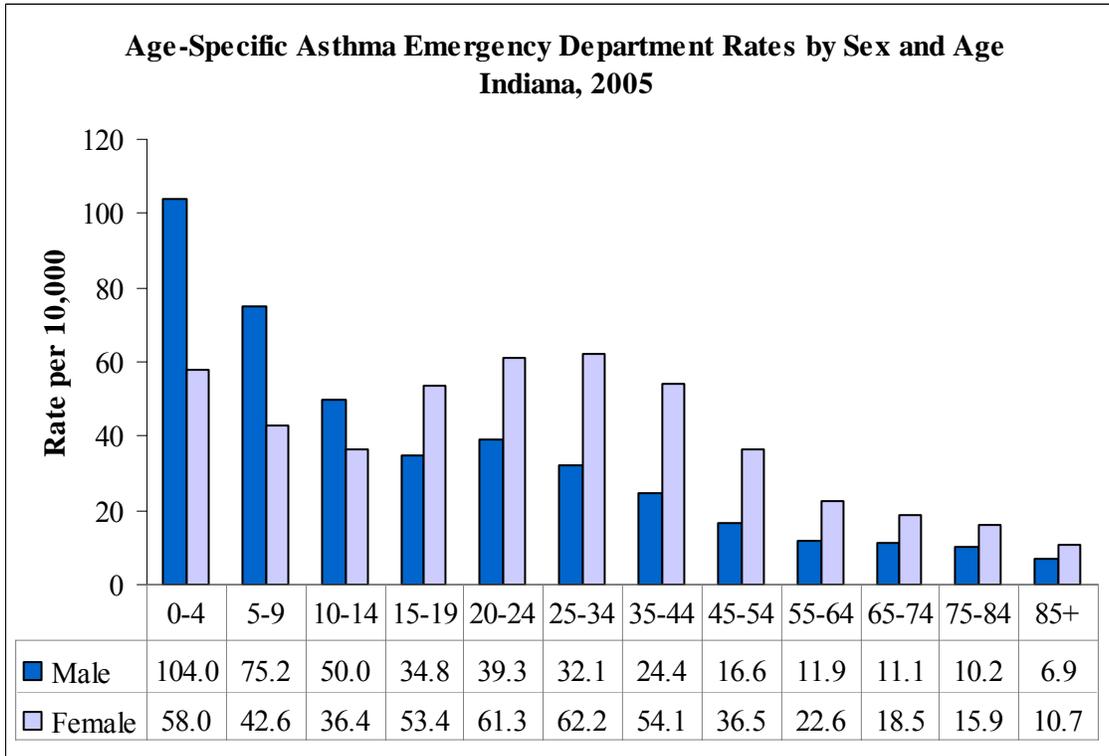
**Figure 39**



Source: ISDH, Chronic Disease Epidemiology

Among children 0-14 years of age, asthma ED rates for males were higher than for females. However, between the ages of 15 and 19 the asthma ED rate for females was higher than for males. This difference between females and males continued through adulthood with females having a higher asthma ED rate than did males (Figure 40).

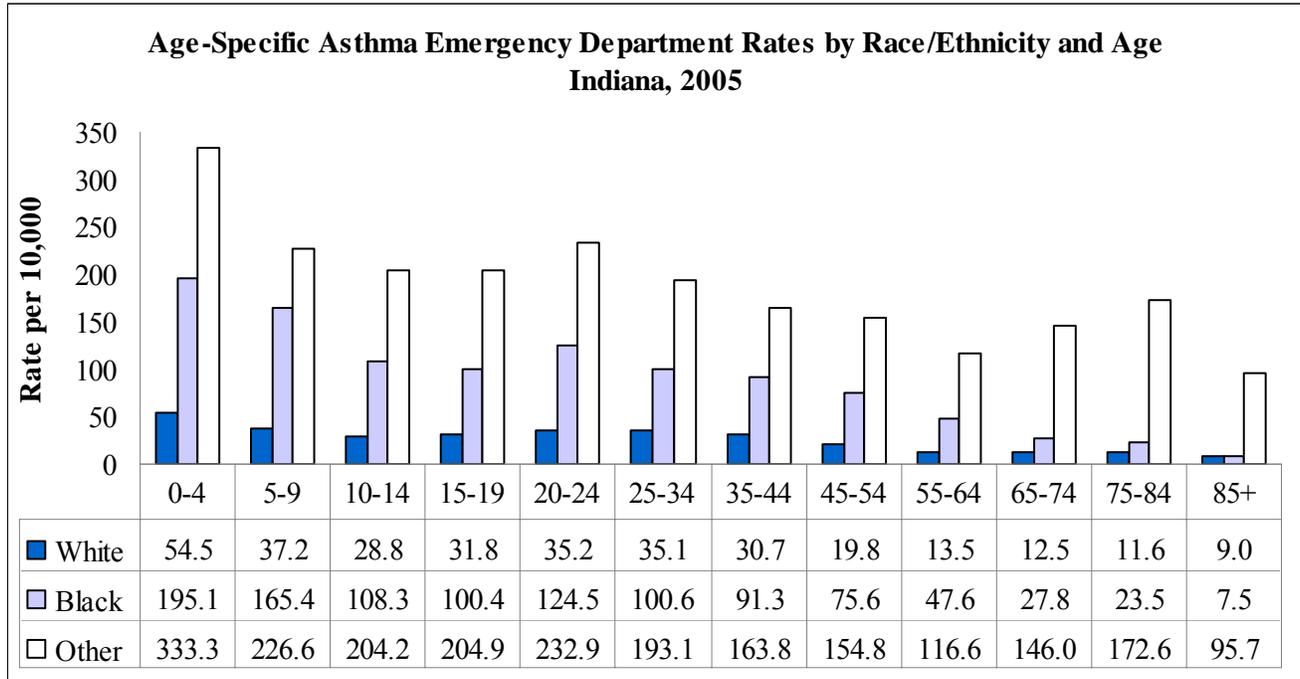
**Figure 40**



Source: ISDH, Chronic Disease Epidemiology

“Other” races/ethnicities had the highest asthma ED rate for all age groups when compared to whites and blacks (Figure 41). However, the rate for “Others” is unreliable because of several factors that could include a small sample size or missing data. This rate is not informative since it is not more specific in identifying which races/ethnicities make up this category. The asthma ED rate for blacks, when compared to whites only, was higher for all age groups except those persons 85 years and older.

**Figure 41**

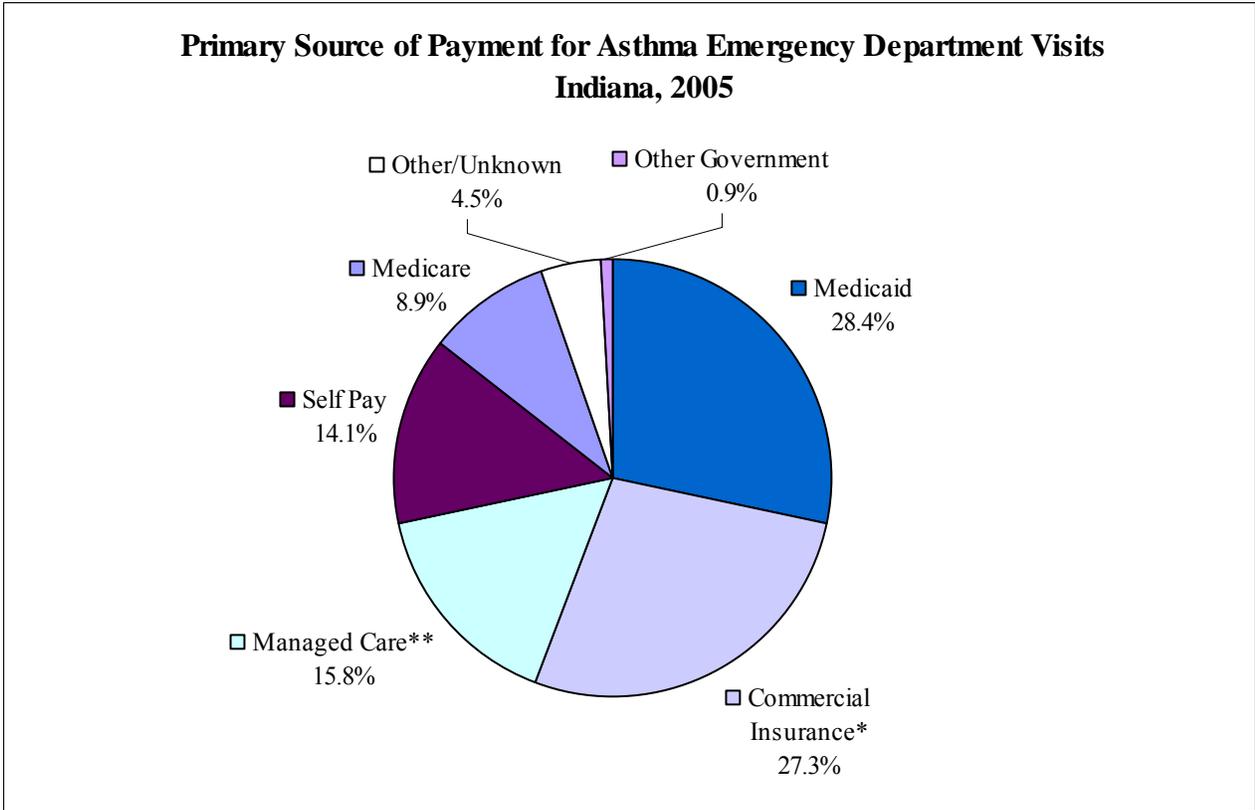


Source: ISDH, Chronic Disease Epidemiology

**Emergency Department Visits: Primary Source of Payment**

The total ED cost for Indiana was \$25,002,659 for 24,320 ED visits with a discharge diagnosis of asthma. This creates an average cost of \$1,028 per emergency room visit for asthma. As shown in Figure 42, more than half of all ED charges for asthma were charged to either Medicaid (28.4%) or commercial insurance (27.3%). Self pay for asthma ED visits made up more than three million dollars and 14.1% of charges. This was almost three times the percentage of asthma hospitalization charges that were self pay (5.3%).

**Figure 42**



Source: ISDH, Chronic Disease Epidemiology  
\*This is private commercial insurance (excludes managed care)  
\*\*This is private managed care insurance (non-Medicaid and non-government)

## ASTHMA AMONG INDIANA MEDICAID MEMBERS

Hoosier Healthwise (Medicaid) is Indiana's health care program for children, pregnant women, and low-income individuals and families. Indiana Medicaid also includes populations in the Medicaid Select program (a health insurance program for Medicaid-eligible residents who are blind, aged and disabled) and in Traditional Medicaid (fee-for-service). These health care programs are administered by the Indiana Family and Social Services Administration (FSSA) through the Office of Medicaid Policy and Planning (OMPP).

The source of the Medicaid claims and enrollment data for the State of Indiana was OMPP. The Medicaid data included clinic, emergency room, hospital, and pharmacy claims submitted to Medicaid for provider reimbursement, for services which Indiana Medicaid covers. The Medicaid data analysis excludes people aged 65 and older.

Prevalence figures are reported based on individuals who were Indiana Medicaid members during December 2006 and who were in Indiana Medicaid for at least 11 of 12 months of calendar year 2006. For any asthma, the definition was any ICD9 code of 493.XX or at least three prescriptions for asthma medicines during 2006.

**In 2003, several large counties in Indiana had mandatory risk-based managed care for children in Hoosier Healthwise. By 2006, risk-based managed care in Hoosier Healthwise was mandatory statewide. Thus, the Medicaid prevalence figures reported are based to a large extent on non-reimbursed encounter claims (“shadow claims”). Because of underreporting of such encounter claims, it is likely that the prevalence figures in this report are substantial underestimates. Also, the underestimates are probably more pronounced in this report than in the burden report published in 2004 (which used data from Fiscal Year 2003).**

In 2006, of the 635,348 adults and children under age 65 enrolled in Medicaid, 48,252 (7.6%) had a diagnosis of asthma. Adults enrolled in Medicaid were two times more likely to meet the asthma definition (12%) than were children (5.7%), but the adult figure likely also included persons with Chronic Obstructive Pulmonary Disease (COPD). There was very little difference in the asthma prevalence between males (7.3%) and females (7.8%) enrolled in Medicaid (Table 8).

**Table 8: Asthma Among Medicaid Members by Sex  
Indiana, 2006**

Sex	Total Number in Medicaid	Total Number with Asthma	Asthma Prevalence (%)
Male	291,086	21,259	7.3%
Female	344,113	26,993	7.8%
<b>Total</b>	635,199*	48,252	7.6%

Source: Indiana Family and Social Services Administration (FSSA) through the Office of Medicaid Policy and Planning (OMPP)

\* 149 enrolled Medicaid members were missing data for “sex”.

Per Table 9, asthma prevalence was higher for whites (8.5%) than blacks (6.8%), Hispanics (3.7%), and other races (4.5%). Note these figures might reflect substantial underreporting of asthma, as discussed above.

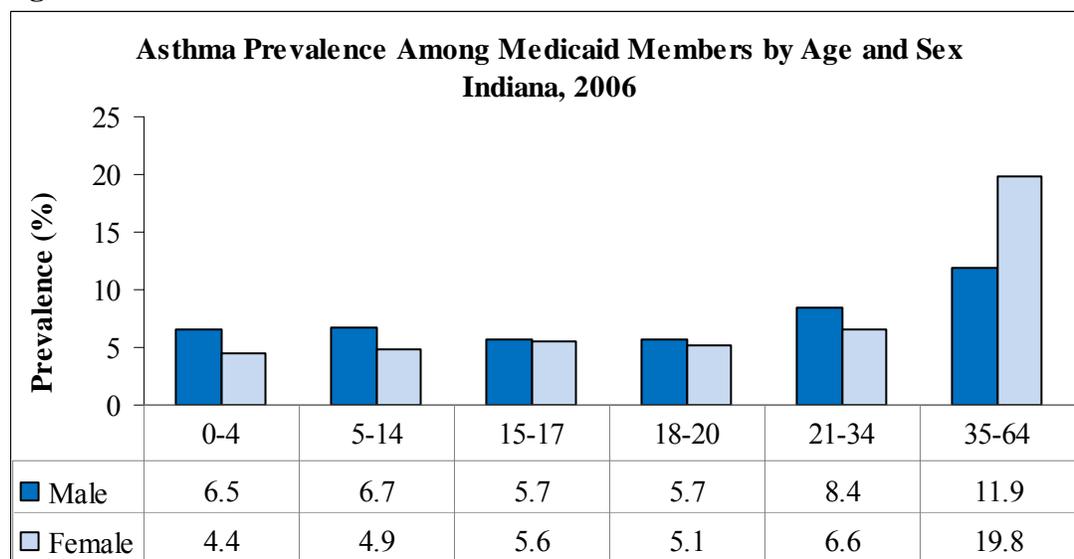
**Table 9: Asthma Among Medicaid Members by Race/Ethnicity  
Indiana, 2006**

Race	Total Number in Medicaid	Total Number with Asthma	Asthma Prevalence (%)
<b>White</b>	417,262	35,485	8.5%
<b>Black</b>	150,640	10,195	6.8%
<b>Hispanics</b>	55,068	2,009	3.7%
<b>Other</b>	12,378	563	4.5%
<b>Total</b>	635,348	48,252	7.6%

Source: Indiana Family and Social Services Administration (FSSA) through the Office of Medicaid Policy and Planning (OMPP)

In 2006, males had a higher prevalence of asthma among individuals between the ages of 0 and 34. However, females had a higher prevalence of asthma (almost two times that of males) among individuals between the ages of 35 and 64 (Figure 43).

**Figure 43**



Source: Indiana Family and Social Services Administration (FSSA) through the Office of Medicaid Policy and Planning (OMPP).

**Children Enrolled in Medicaid**

Asthma prevalence for boys (6.5%) enrolled in Medicaid was higher than for girls (4.8%). See Table 10.

**Table 10: Asthma Among Medicaid Members 0-17 Years of Age by Sex  
Indiana, 2006**

<b>Sex</b>	<b>Total Number in Medicaid</b>	<b>Total Number with Asthma</b>	<b>Asthma Prevalence (%)</b>
<b>Male</b>	231,510	15,093	6.5%
<b>Female</b>	213,955	10,331	4.8%
<b>Total</b>	445,465*	25,424	5.7%

Source: Indiana Family and Social Services Administration (FSSA) through the Office of Medicaid Policy and Planning (OMPP)

\* 149 enrolled Medicaid members were missing data for "sex".

Asthma prevalence of white and black children was the same at 6% (Table 11) and higher than Hispanic children and children of other races/ethnicities. Note that these figures might reflect substantial underreporting of asthma, as discussed above.

**Table 11: Asthma Among Medicaid Members 0-17 Years of Age by Race/Ethnicity  
Indiana, 2006**

<b>Race</b>	<b>Total Number in Medicaid</b>	<b>Total Number with Asthma</b>	<b>Asthma Prevalence (%)</b>
<b>White</b>	278,932	16,807	6%
<b>Black</b>	110,017	6,627	6%
<b>Hispanic</b>	46,246	1,598	3.5%
<b>Other</b>	10,419	392	3.8%
<b>Total</b>	445,614	25,424	5.7%

Source: Indiana Family and Social Services Administration (FSSA) through the Office of Medicaid Policy and Planning (OMPP)

**Adults Enrolled in Medicaid**

Asthma prevalence for adult males (10.4%) enrolled in Medicaid was lower than for adult females (12.8%). See Table 12.

**Table 12: Asthma Among Adult Medicaid Members by Sex  
Indiana, 2006**

<b>Sex</b>	<b>Total Number in Medicaid</b>	<b>Total Number with Asthma</b>	<b>Asthma Prevalence (%)</b>
<b>Male</b>	59,576	6,166	10.4%
<b>Female</b>	130,158	16,662	12.8%
<b>Total</b>	189,734	22,828	12.0%

Source: Indiana Family and Social Services Administration (FSSA) through the Office of Medicaid Policy and Planning (OMPP)

Asthma prevalence among white adults (13.5%) was higher than among blacks, Hispanics, and other races/ethnicities (Table 13). Note these figures might reflect substantial underreporting of asthma, as discussed above.

**Table 13: Asthma Among Adult Medicaid Members by Race/Ethnicity  
Indiana, 2006**

<b>Race</b>	<b>Total Number in Medicaid</b>	<b>Total Number with Asthma</b>	<b>Asthma Prevalence (%)</b>
White	138,330	18,678	13.5%
Black	40,623	3,568	8.8%
Hispanic	8,822	411	4.7%
Other	19,59	171	8.7%
<b>Total</b>	189,734	22,828	12.0%

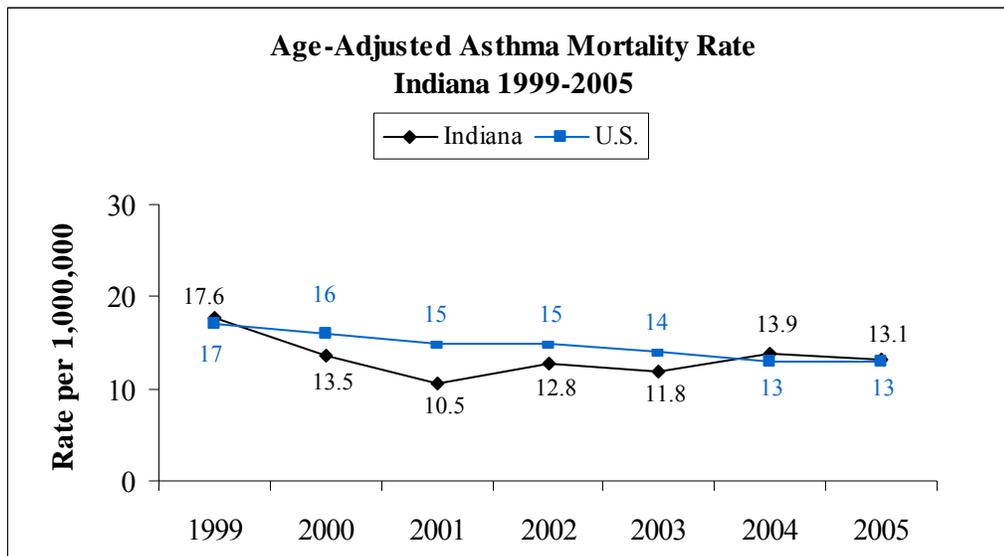
Source: Indiana Family and Social Services Administration (FSSA) through the Office of Medicaid Policy and Planning (OMPP).

## MORTALITY

There are relatively few deaths due to asthma each year compared to hospitalizations. Asthma deaths can usually be prevented with proper care and management. Mortality data represents the deaths of Indiana residents and are based on the underlying cause of death listed on the Indiana death certificate. Information is provided to the Indiana State Department of Health on each cause of death under the authority of Indiana State Code 16-1-15-5. A death from asthma is defined as a death with an underlying cause of death code in J45-46 (ICD-10).

In 2005, there were 85 deaths (about 13.1 per 1,000,000) due to asthma in Indiana. The total number of deaths due to asthma in Indiana declined from 104 in 1999 to 85 in 2005 (18% reduction). During the same time period, the Indiana asthma mortality rate has been relatively stable (Figure 44). Not enough information is available at this time to explain the higher rate in 1999 or its significance compared to the other years.

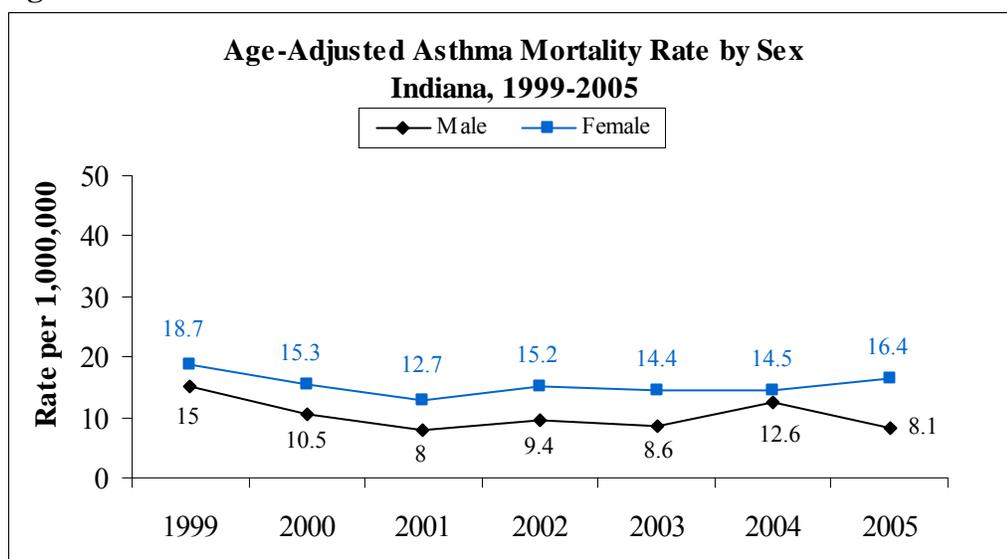
**Figure 44**



Source: ISDH, Public Health System Development & Data Commission, Data Analysis Team

In 2005, out of 85 deaths due to asthma, 60 were females (71%) and 25 were males (29%). The asthma mortality rate for females is historically higher than the rate for males (Figure 45).

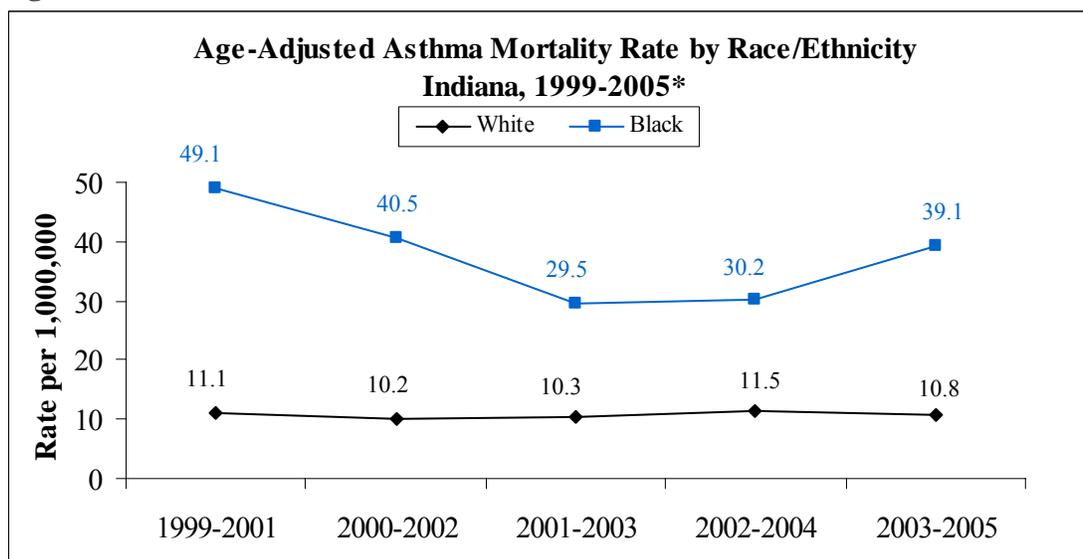
**Figure 45**



Source: ISDH, Public Health System Development & Data Commission, Data Analysis Team

In 2005, out of 85 deaths due to asthma, 58 (9.8 per 1,000,000) were white and 27 (55 per 1,000,000) were black. No asthma deaths were attributed to Hispanics and/or other races in 2005. From 1999 to 2004, the small number of deaths due to asthma by race/ethnicity was too small to calculate a reliable rate. For this reason, 3-year rolling averages were used to look at deaths due to asthma from 1999 to 2005. The mortality rate for whites has been constant for the past few years (Figure 46). The mortality rate for blacks is historically higher than the rate for whites. From 1999 to 2005 the asthma mortality rates among blacks decreased from 49.1 per 1,000,000 to 39.1 per 1,000,000.

**Figure 46**

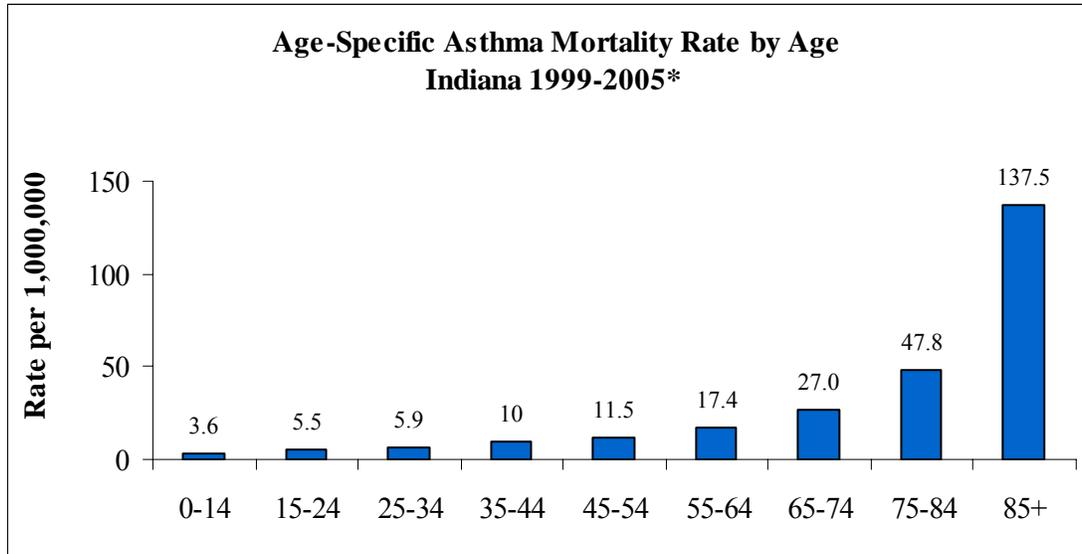


Source: ISDH, Public Health System Development & Data Commission, Data Analysis Team

\* Trend data based on 3-year rolling averages because of small number of deaths due to asthma by race.

Indiana's asthma mortality rate increased with age (Figure 47). Children 0-14 years of age had an asthma mortality rate of 3.6 per 1,000,000 compared to Indiana's adults 85 years of age and older, who had an asthma mortality rate of 137.5 per 1,000,000.

**Figure 47**



Source: ISDH, Public Health System Development & Data Commission, Data Analysis Team

## HEALTHY PEOPLE 2010 GOALS

Healthy People 2010 was developed by the U.S. Department of Health and Human Services to set health objectives for the nation to achieve by the year 2010. Measurable objectives exist for numerous health conditions and associated behaviors such as diabetes, depression, tobacco use and asthma. By aligning state efforts to Healthy People 2010 objectives, Indiana can compare its asthma burden to other states and the nation, measuring progress over time in achieving the objectives.

There are two Healthy People 2010 objectives (Section 1.9 and 24) addressing asthma. The objectives for asthma include mortality rates, hospitalization rates and emergency department rates for different age groups. These objectives are compared to Indiana rates below (Table 14, 15, 16 & 17). Also, Healthy People 2010 objectives exist for activity limitation, school and work days lost, patient education, and appropriate asthma care for persons with asthma (according to the National Asthma Education and Prevention Program asthma guidelines). These objectives are not compared to Indiana data in this report because the data is not available at this time.

**Table 14: Healthy People 2010 Objective 1-9a. Reduce hospitalization rates for three ambulatory-care-sensitive conditions: pediatric asthma, uncontrolled diabetes, and immunization-preventable pneumonia and influenza.**

Age Group	Healthy People 2010 Goal (Pediatric asthma)
0 to 17 Years	17.3 per 10,000

Data source: Healthy People 2010, <http://www.healthypeople.gov/Document/HTML/Volume1/01Access.htm>, Healthcare Cost and Utilization Project (HCUP), AHRQ.

Indiana has met Healthy People 2010 Objective 1-9a for asthma hospitalizations among children under 18. The Indiana hospitalization rate due to asthma for children under 18 was 13.2 per 10,000.

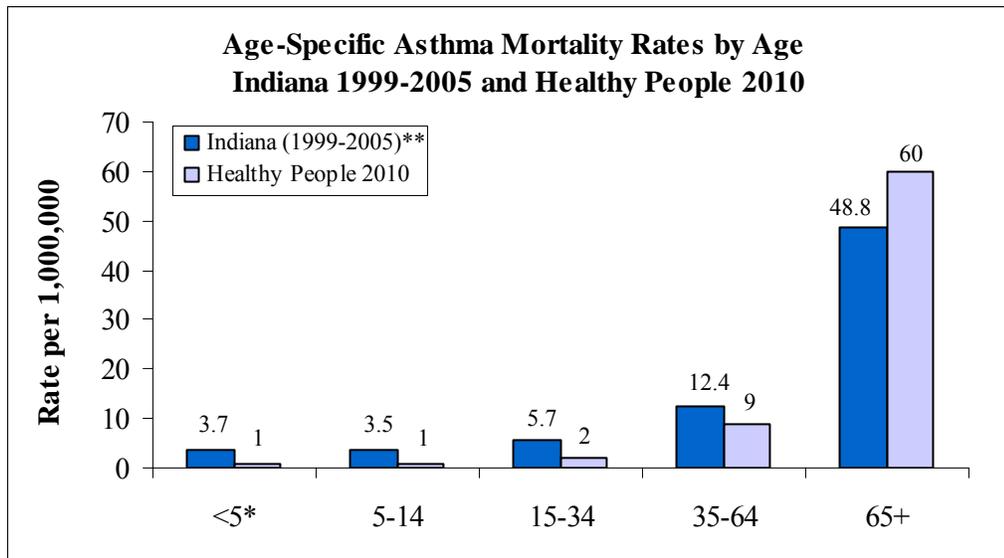
**Table 15: Healthy People 2010 Objective 24-1. Reduce asthma deaths.**

Age Group	Healthy People 2010 Goal
0 to 4 Years	1.0 per 1,000,000
5 to 14 Years	1.0 per 1,000,000
15 to 34 Years	2.0 per 1,000,000
35 to 64 Years	9.0 per 1,000,000
≥ 65 Years	60.0 per 1,000,000

Data Source: Healthy People 2010, [www.healthypeople.gov/document/html/volume2/24respiratory.htm](http://www.healthypeople.gov/document/html/volume2/24respiratory.htm), National Vital Statistics System (NVSS), CDC, NCHS.

Indiana has not met Healthy People 2010 asthma mortality rate objectives for the age groups 5-14 years, 15-34 years and 35-64 years. The Indiana rate provided for individuals younger than 5 was not a stable rate due to the small number of deaths in this age group. Therefore, it cannot reliably be compared to the Healthy People 2010 objective. Indiana has met the Healthy People 2010 asthma mortality rate for individuals 65 years and older. The Indiana mortality rates provided for all age groups were for 1999-2005. Rates were not stable for single years due to the small number of deaths per year in Indiana (Figure 48).

**Figure 48**



Source: ISDH, Chronic Disease Epidemiology and Healthy People 2010

[www.healthypeople.gov/document/html/volume2/24respiratory.htm](http://www.healthypeople.gov/document/html/volume2/24respiratory.htm)

\* There were only 11 deaths for this age group, therefore, the rate was unstable.

\*\* Due to small samples size per year, data from 1999 to 2005 has been collapsed.

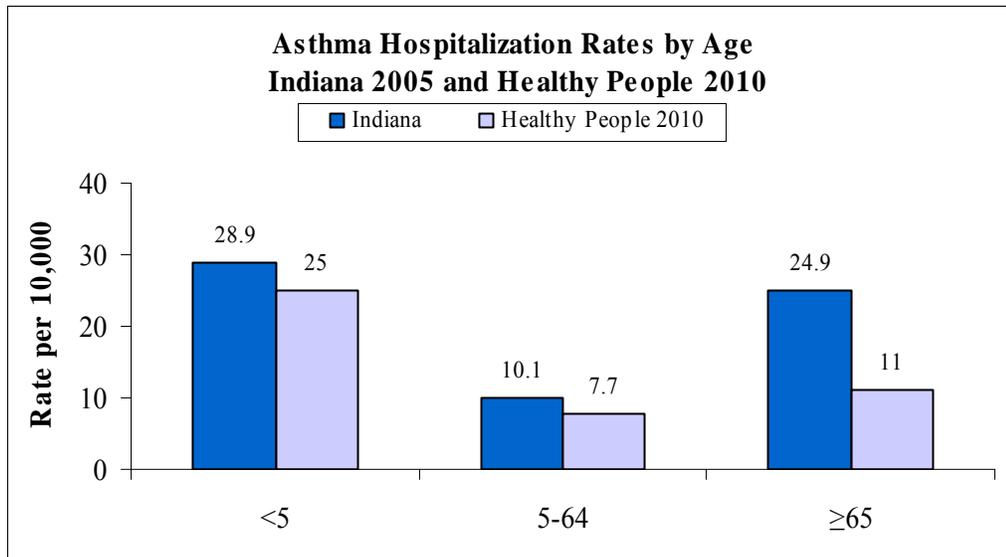
**Table 16: Healthy People 2010 Objective 24-2. Reduce hospitalizations for asthma.**

Age Group	Healthy People 2010 Goal
0 to 4 Years	25 per 10,000
5 to 64 Years	7.7 per 10,000
≥ 65 Years	11 per 10,000

Data Source: National Hospital Discharge Survey (NHDS), CDC, NCHS.

Indiana has not met Healthy People 2010 asthma hospitalization rate objectives for any age group (Figure 49).

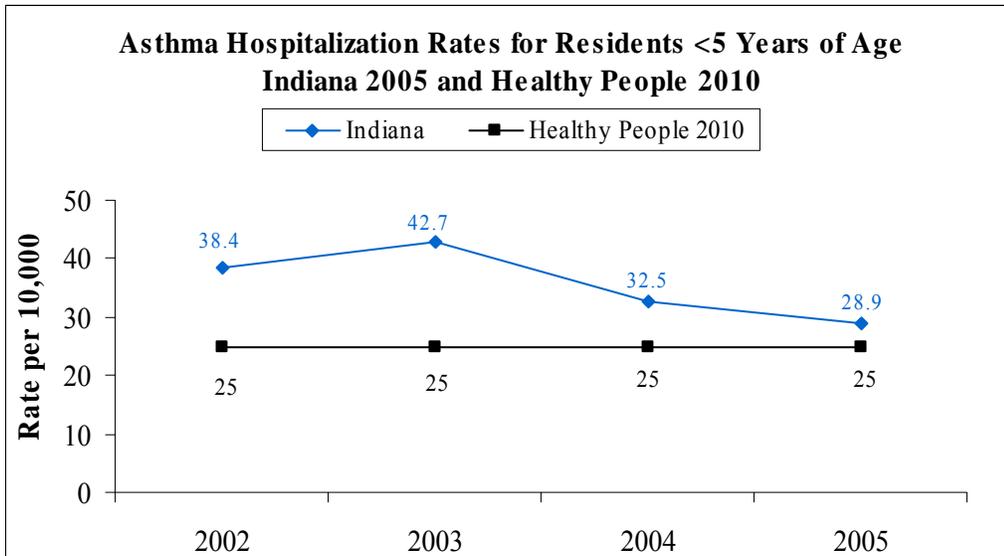
**Figure 49**



Source: ISDH, Chronic Disease Epidemiology and Healthy People 2010  
[www.healthypeople.gov/document/html/volume2/24respiratory.htm](http://www.healthypeople.gov/document/html/volume2/24respiratory.htm)

Asthma hospitalization rates for children under the age of five have decreased (24.7%) since 2002 from 38.4 to 28.9 per 10,000, showing improvement toward the Healthy People 2010 objective (25 per 10,000) (Figure 50).

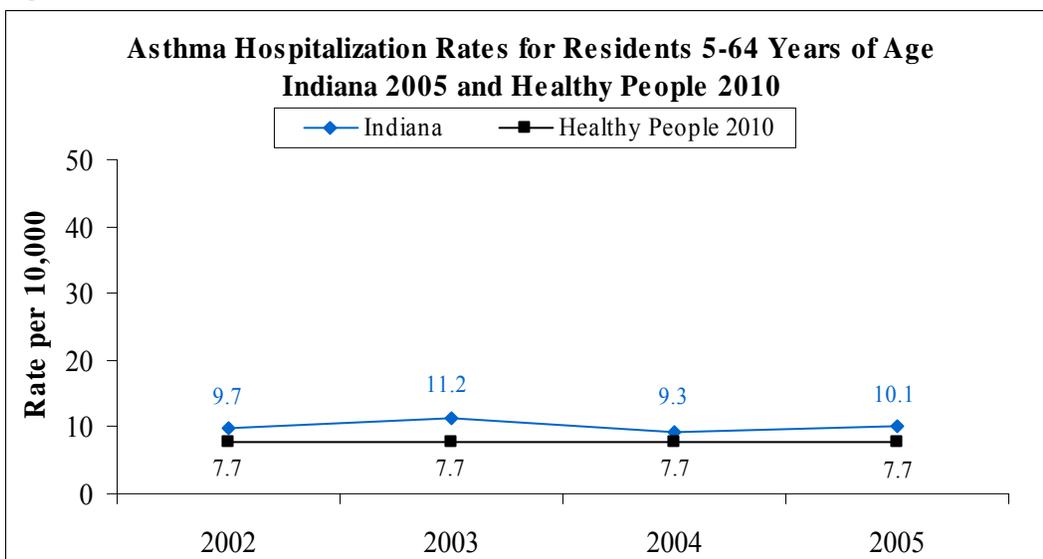
**Figure 50**



Source: ISDH, Chronic Disease Epidemiology and Healthy People 2010  
[www.healthypeople.gov/document/html/volume2/24respiratory.htm](http://www.healthypeople.gov/document/html/volume2/24respiratory.htm)

Asthma hospitalization rates for residents 5-64 years have remained relatively constant since 2002, ranging from 9.3 to 11.2 per 10,000 (Figure 51).

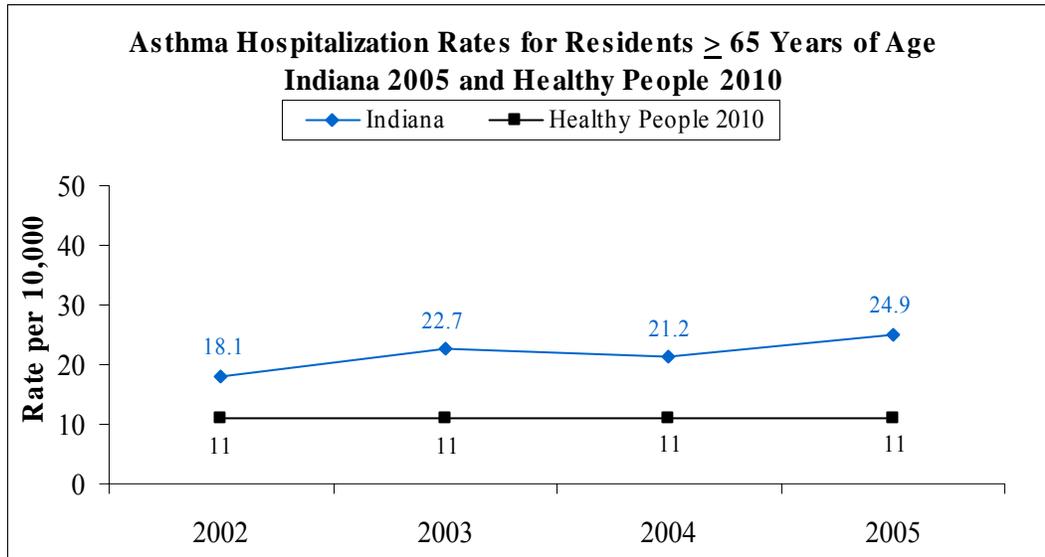
**Figure 51**



Source: ISDH, Chronic Disease Epidemiology and Healthy People 2010  
[www.healthypeople.gov/document/html/volume2/24respiratory.htm](http://www.healthypeople.gov/document/html/volume2/24respiratory.htm)

Asthma hospitalization rates for adults 65 and older have increased since 2002 from 18.1 to 24.9 per 10,000 (Figure 52).

**Figure 52**



Source: ISDH, Chronic Disease Epidemiology and Healthy People 2010  
[www.healthypeople.gov/document/html/volume2/24respiratory.htm](http://www.healthypeople.gov/document/html/volume2/24respiratory.htm)

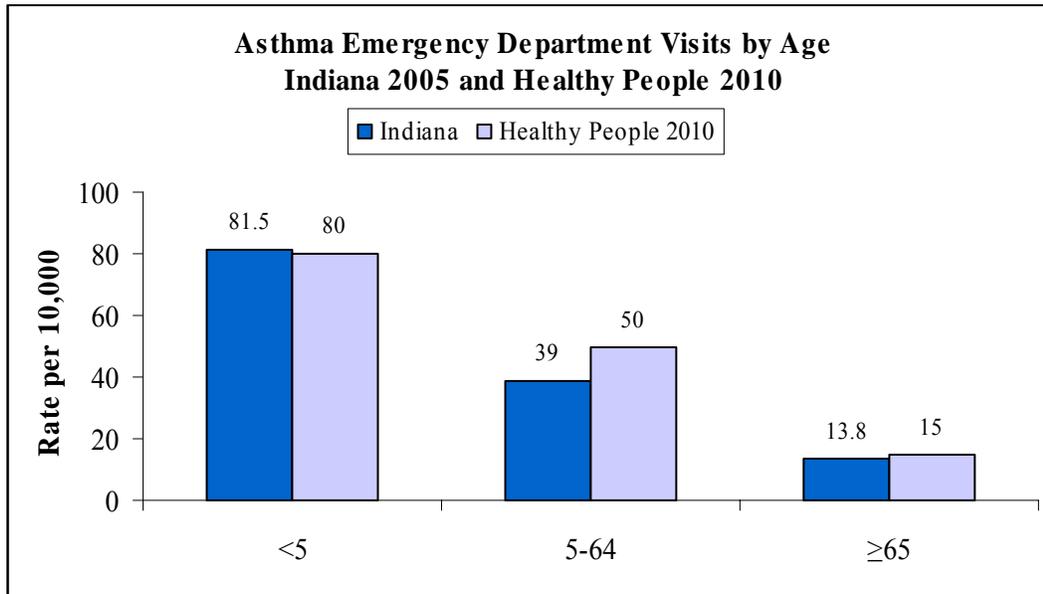
**Table 17: Healthy People 2010 Objective 24-3. Reduce hospital emergency department visits for asthma.**

Age Group	Healthy People 2010 Goal
< 5 Years	80 per 10,000
5 to 64 Years	50 per 10,000
≥ 65 Years	15 per 10,000

Data Source: National Hospital Ambulatory Medical Care Survey (NHAMCS), CDC, NCHS.

Indiana has met Healthy People 2010 asthma emergency visit rates for age groups 5-64 and ≥ 65. Indiana still has a higher rate for young children (< 5), but the rate is close to meeting the Healthy People 2010 objective (Figure 53).

**Figure 53**



Source: ISDH, Chronic Disease Epidemiology and Healthy People 2010  
[www.healthypeople.gov/document/html/volume2/24respiratory.htm](http://www.healthypeople.gov/document/html/volume2/24respiratory.htm)

## THE FINANCIAL COST OF ASTHMA

Like most medical conditions, determining the financial costs due to asthma is a complex and difficult process. The costs of asthma accumulate through direct medical expenses (hospitalizations, emergency department visits, prescription drugs, etc.), lost productivity (work and school absences, activity limitations, etc.) and premature death. The data below provide estimates for total asthma costs in the United States and Indiana, as well as data on asthma hospitalization charges in Indiana.

The National Heart, Lung, and Blood Institute (NHLBI) releases estimates for direct and indirect costs of cardiovascular, lung, and blood diseases every few years in the *Morbidity and Mortality Chart Book*. In the 2007 *Chart Book*, total annual costs for asthma in the United States were estimated to be \$19.7 billion. Of the \$19.7 billion, \$14.7 billion were direct medical costs, \$3.1 billion were costs due to morbidity and \$1.9 billion were costs due to mortality. Further, the NHLBI divided the \$14.7 billion direct costs by hospital care (\$4.7 billion), physician services (\$3.8 billion) and prescription drugs (\$6.2 billion) (6).

The financial costs of asthma in Indiana can only be estimated as well. At this time, the Indiana State Department of Health's Asthma Program does not have comprehensive cost data specific to Indiana. However, the Agency for Healthcare Research and Quality has published asthma costs by state using an average annual asthma cost (2003 dollars) and estimated asthma prevalence (8.1% in Indiana in 2003). For 2003, the estimated total asthma costs for Indiana were \$530,612,912. Direct costs represented \$304,116,298 and indirect costs represented \$226,496,615 of the total (7). As in the national estimate, direct costs represent expenditures for hospitalization, physician services, and medications. Indirect costs due to asthma typically include costs due to lost work or school days and costs due to asthma deaths.

Actual charges for inpatient hospital and emergency department (ED) visits for Indiana residents with a discharge diagnosis of asthma are available. In 2005, total inpatient charges were \$73,482,966 for 8,302 hospitalizations with a discharge diagnosis of asthma. This results in an average cost of \$8,851 per asthma hospitalization. Total ED charges were \$25,002,659 for 24,320 ED visits with a discharge diagnosis of asthma. This results in an average cost of \$1,028 per each ED visit for asthma.

Although the exact costs of asthma cannot be determined, the available data and best estimates support that asthma is a very costly disease in the state of Indiana and the nation. There will always be some financial burden due to asthma, but the costs to individuals, Indiana, and the nation can be reduced by properly controlling asthma.

## CONCLUSION

This report is a detailed account of asthma in Indiana and how it is affecting people in the state. Asthma is a major public health issue nationally and within Indiana. As previously mentioned, asthma's impact on health, quality of life, and the economy in Indiana continues to grow. It often results in restricted activities, school and work absenteeism, hospitalizations and visits to the emergency department (ED), and disruption of family and caregiver routine. As the Indiana State Department of Health's (ISDH) Asthma Program, the Indiana Joint Asthma Coalition (InJAC), and other partners move forward in addressing asthma throughout the state, several conclusions can be drawn from this report.

Indiana data show asthma disproportionately affects women, young children, certain minorities and the poor with higher prevalence rates, hospitalizations, ED visits, and death. In 2005 asthma prevalence as well as asthma hospitalization, ED, and mortality rates in Indiana were higher for females than males. However, asthma hospitalization and ED rates were higher for males  $\leq 14$  years of age. While the prevalence of current asthma was not significantly different between whites and blacks, blacks had higher (almost three times or more) rates of hospitalizations, ED, and mortality due to asthma. Children 0-4 years of age had the highest asthma ED rate and the 3<sup>rd</sup> highest rate of asthma hospitalizations when compared to other age groups. Adults 75 years of age and older had the highest asthma hospitalization rates. Asthma prevalence was highest among those with an annual household income of less than \$15,000 per year.

There could be numerous reasons why women, children, certain minorities, and those in poverty are disproportionately affected by asthma. These might include genetic differences, poverty, environmental exposures, lack of patient education, etc. More research and data are needed to determine which factors most contribute to these disparities in Indiana. In the meantime, asthma interventions, partnerships, funding, and policy should target these specific populations.

To assist in planning interventions and to help program partners, the Asthma Program maintains a comprehensive asthma surveillance system. Medicaid data contribute greatly to this system. Analyses for the purpose of this report clearly suggest that Medicaid data are substantially underreported. By 2006, risk-based managed care in Hoosier Healthwise was mandatory statewide. Thus, the Medicaid prevalence figures reported were based to a large extent on non-reimbursed encounter claims ("shadow claims"). Because of substantial underreporting of such encounter claims, it is likely the prevalence figures in this report were substantial underestimates. Also, the underestimates are probably worse in this report than in the burden report published in 2004 (which used data from Fiscal Year 2003).

It is unclear how to best improve reporting of Medicaid encounter ("shadow claim") data. The Asthma Program and the InJAC should consider opportunities to work more closely with the State of Indiana's Office of Medicaid Policy and Planning (OMPP) as it relates to Medicaid data and analysis. Also, based in part on the future shape of the data, there may be many opportunities available to look at costs of asthma, health care visits and pharmaceutical use among Medicaid members, which were not covered in this report.

As the Asthma Program continues to build its comprehensive asthma surveillance system, additions to this report include ED data, child asthma prevalence data, and data from the Adult Asthma History module (BRFSS). These data sets contribute more information to understanding the severity of asthma in Indiana, costs of asthma, health care utilization, and asthma disease management. ED data also contributes to the state's comparison to the Healthy People 2010 objectives. In *The Burden of Asthma*

*in Indiana, 2004*, though much data was available, there was not a direct comparison of Indiana's data to the Healthy People 2010 objectives. Indiana can compare its asthma burden to the nation, attempting to measure progress over time in achieving the Healthy People 2010 objectives for asthma. This report provides information and comparisons on three measures (i.e. hospitalizations, ED visits, and mortality) of the Healthy People 2010 objectives.

The Healthy People 2010 objectives are the long-term outcomes of the Asthma Program and should be the suggested long-term outcomes for others working on asthma interventions. Program planning, implementation and evaluation should focus on reducing hospitalizations, ED visits, and deaths.

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## APPENDIX A: DATA LIMITATIONS

### *Behavioral Risk Factor Surveillance System (BRFSS)*

- Self-reported data. This limitation should be understood in the interpretation of the data. Many times, respondents have the tendency to underreport some behaviors that may be considered socially unacceptable or unhealthy, such as smoking, high alcohol consumption, etc. Conversely, respondents may over-report behaviors that are considered desirable (the amount of exercise done, low body weight, or regular health screenings). Some information is also affected by the ability of the respondent to recall past behaviors and respond accordingly. The validity of survey results depends on the accuracy of the responses to the survey questions from recalled past behaviors.
- Excludes children under the age of 18, institutionalized adults, adults in the military service, adults without home telephones, and adults without home telephones with landlines.
- Breaking down the data into smaller categories decreases the sample size of the original risk factor categories, thereby decreasing the ability to determine statistically significant differences.
- Weighting the data by the age, race, and sex distribution of the state was done in order to correct for over- or under representation of all groups. Prevalence based on denominators of less than 50 respondents was considered statistically unreliable.
- The prevalence rates calculated from the BRFSS data are based on a respondent's self-reported diagnosis of asthma, thus the BRFSS prevalence rates were based on probable cases of asthma.

### *Hospital Discharge and Emergency Department Visits Data*

- Medical practice patterns and payment mechanisms may be different from state to state or county to county, affecting diagnostic coding and health care provider decisions or choice of diagnostic codes.
- For this report, the unit of analysis is the discharge event, not the patient. The number of hospitalizations is not the same as the number of people hospitalized for asthma, as some people may have been hospitalized more than once during the year.
- Hospitalization data are based on billing statements, so the hospitalization rates were not considered as asthma prevalence.
- Counts and rates, especially those based on a small number of hospitalizations, should be interpreted with caution.
- Starting in 2002, state law required all hospitals to report individual level hospitalization data to the Indiana State Department of Health. For this reason, data cannot be compared from years before 2002 to the years 2002 onward. The Asthma Program will use 2002 as the baseline year for comparing hospitalization data.

### *Medicaid Data*

- By 2006, risk-based managed care in Hoosier Healthwise was mandatory statewide. Thus, the Medicaid prevalence figures reported are based to a large extent on non-reimbursed encounter claims ("shadow claims"). Because of underreporting of such encounter claims, it is likely the prevalence figures in this report are substantial underestimates. Also, the underestimates are probably worse in this report than in the burden report published in 2004 (which used data from Fiscal Year 2003).
- People age 65 and older are not included.
- Those individuals enrolled in Medicaid for less than 11 months were not included.

(Appendix A – Continued)

- In addition to the encounter claims limitation, there are other limitations involving claims lag and various claims reconciliation processes in Medicaid administrative data.
- Not all services are covered by Medicaid.
- For some individuals, other payers pay for services, and Medicaid is the secondary payer. Some utilization data could be lacking for this reason.
- Only those diagnosed with ICD-9-CM Codes 493.00 to 493.99 or who had at least three asthma prescriptions (filled) in one calendar year were included.
- The rates are not age, sex, or race adjusted but rather are reported by age, sex, and race.

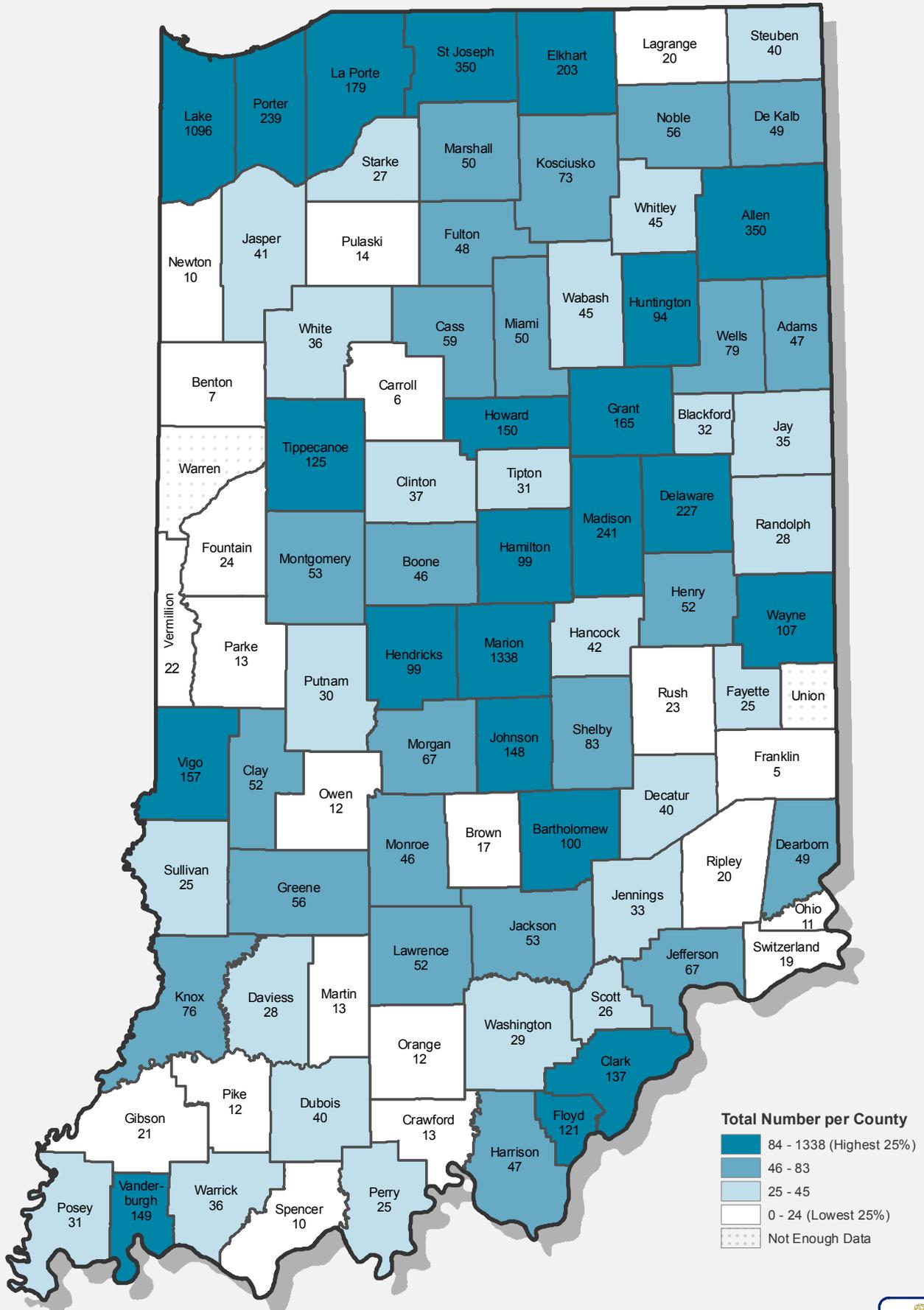
## **APPENDIX B: ADULT ASTHMA HISTORY MODULE QUESTIONS**

1. How old were you when you were first told by a doctor or other health professional that you had asthma?
2. During the past 12 months, have you had an episode of asthma or an asthma attack?
3. During the past 12 months, how many times did you visit an emergency room or urgent care center because of your asthma?
4. During the past 12 months, how many times did you see a doctor, nurse or other health professional for urgent treatment of worsening asthma symptoms?
5. During the past 12 months, how many times did you see a doctor, nurse or other health professional for a routine checkup for your asthma?
6. During the past 12 months, how many days were you unable to work or carry out your usual activities because of your asthma?
7. Symptoms of asthma include cough, wheezing, shortness of breath, chest tightness, and phlegm production when you don't have a cold or respiratory infection. During the past 30 days, how often did you have any symptoms of asthma?
8. During the past 30 days, how many days did symptoms of asthma make it difficult for you to stay asleep?
9. During the past 30 days, how many days did you take a prescription asthma medication to prevent an asthma attack from occurring?
10. During the past 30 days, how often did you use a prescription asthma inhaler during an asthma attack to stop it?

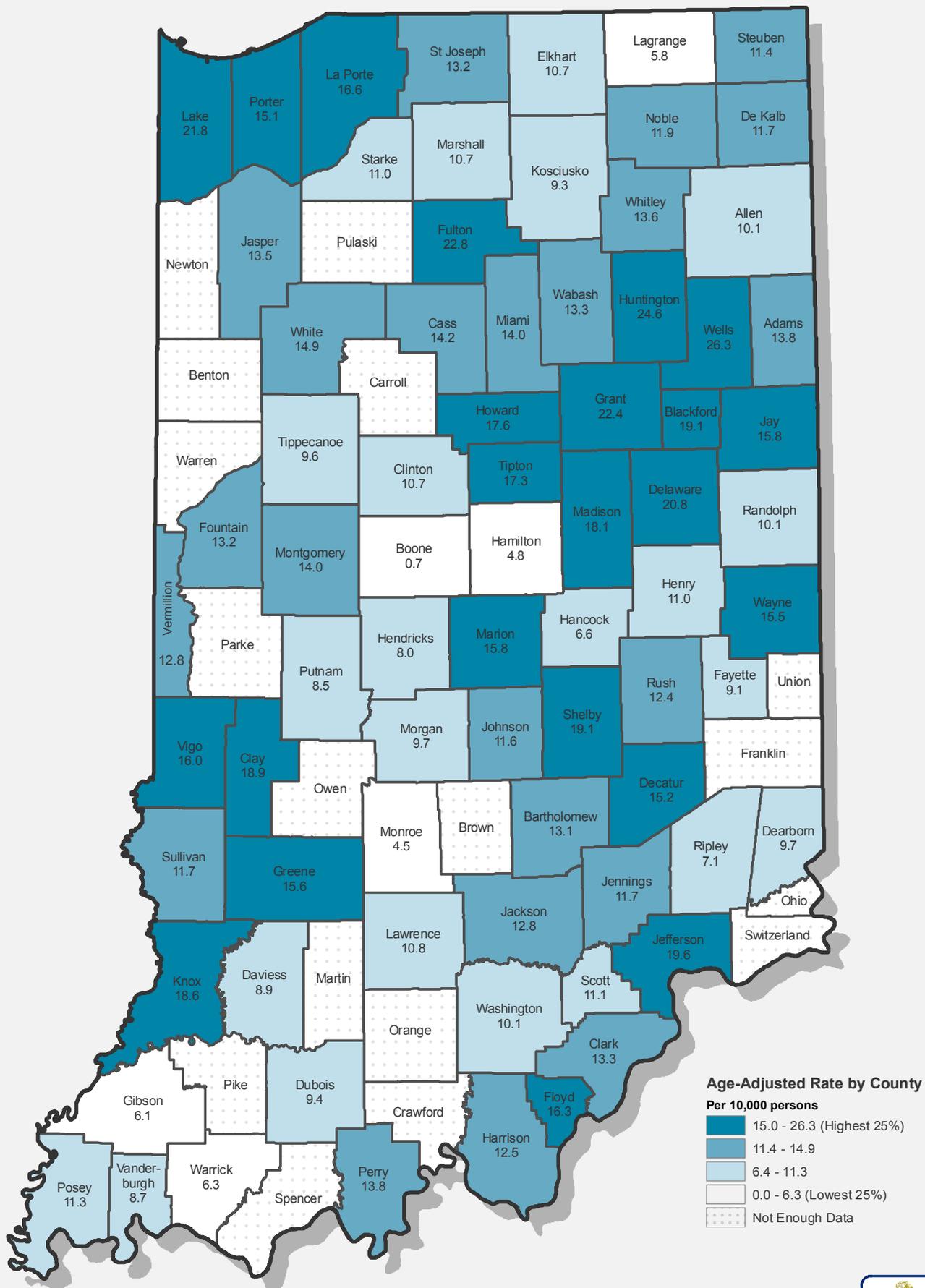
These data apply only to those with current asthma, except question one.

**APPENDIX C: ASTHMA HOSPITALIZATIONS AND AGE-ADJUSTED ASTHMA HOSPITALIZATION RATES BY COUNTY**

# Asthma Hospitalizations by County Indiana, 2005



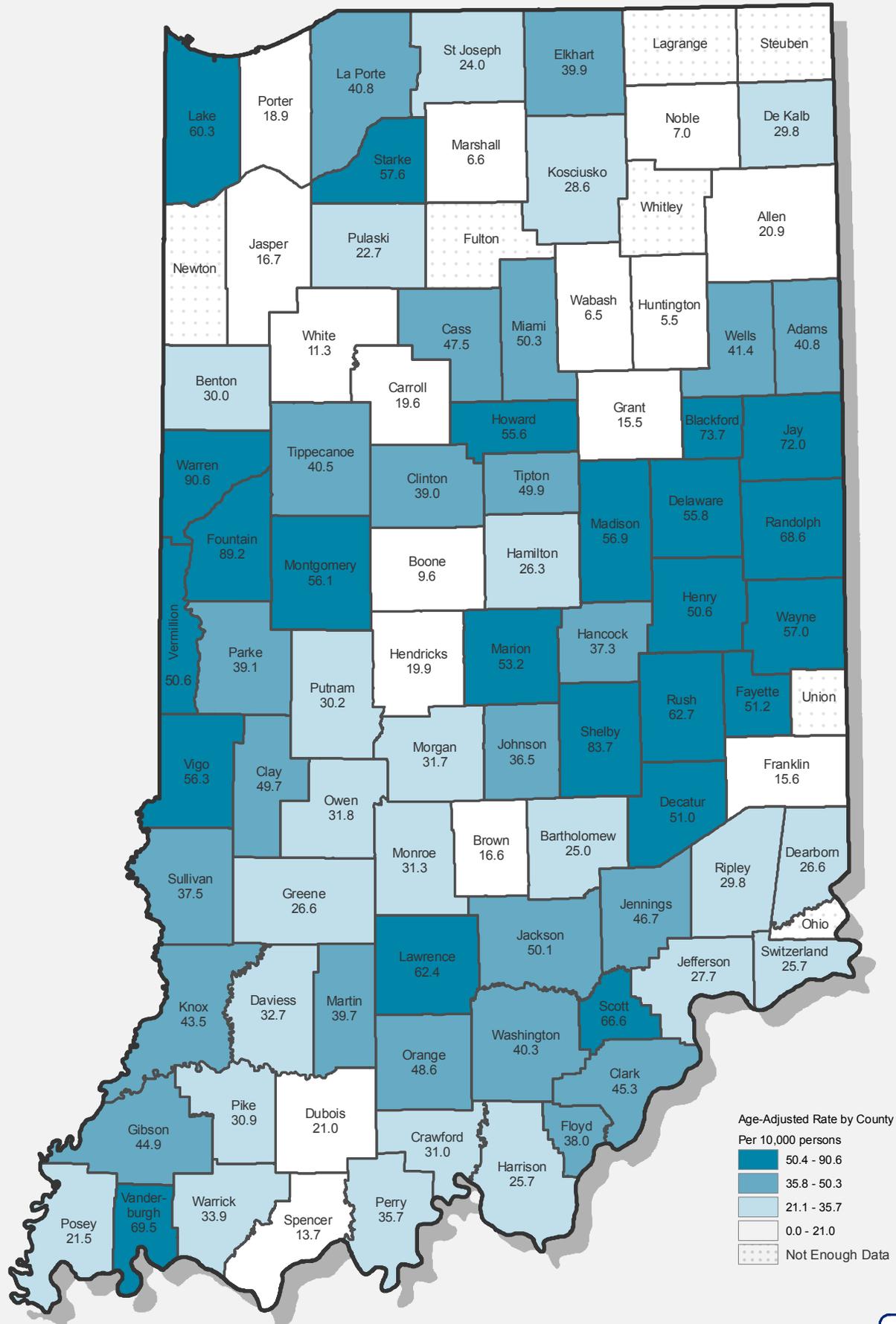
# Age-Adjusted Asthma Hospitalization Rates by County Indiana, 2005



**APPENDIX D: ASTHMA EMERGENCY DEPARTMENT VISITS AND AGE-ADJUSTED  
ASTHMA EMERGENCY DEPARTMENT RATES BY COUNTY**



# Age-Adjusted Asthma Emergency Department Rates by County Indiana, 2005



Age-Adjusted Rate by County  
Per 10,000 persons

- 50.4 - 90.6
- 35.8 - 50.3
- 21.1 - 35.7
- 0.0 - 21.0
- Not Enough Data